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ComputerNews

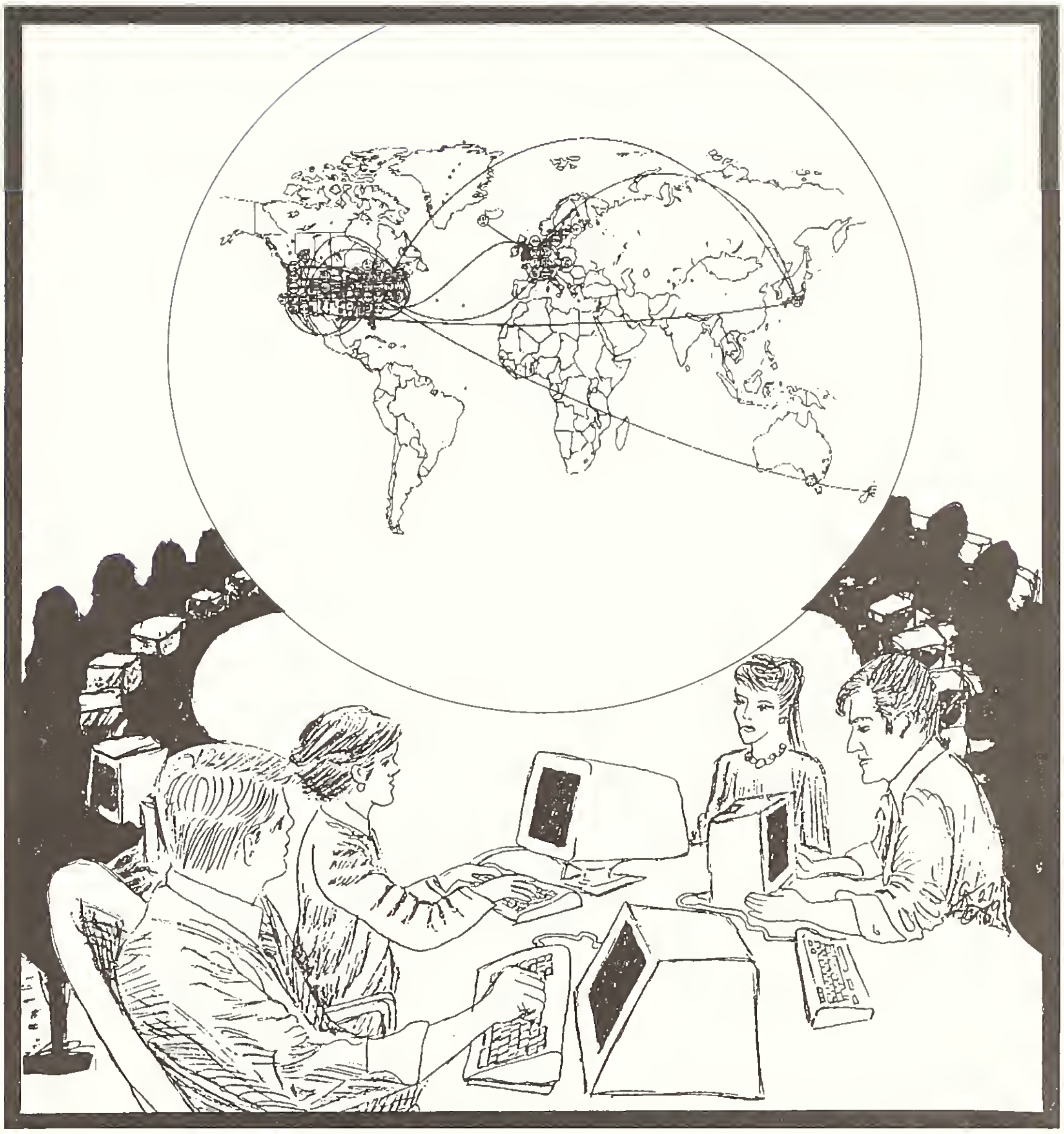

ILLUSTRATION BY: CATHERINE THOMAS

NETWORKS

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This newsletter was entirely produced on a Macintosh using PageMaker and other related Macintosh software.

Let's Talk About It: External Networking Developments I

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Greetings, Gentle Reader: this is my first polemic in quite a while. The gap in my musings is not because nothing of note has been going on at UTCS and in computing and communications on campus, but rather because of other priorities and a touch of laziness. I'm back to tell you about a number of exciting external networking developments. They involve increased connectivity and functionality within Ontario, across Canada, and to the States. The first development involves a network emerging in Ontario called – what else?– ONet. I'll talk a bit about it in this article, and say a few words about standards. In later articles, I'll cover our connection to the US and the rest of Canada. Having been accused in the past of blowing our horn about new networks (specifically NetNorth) when simple UNIX-type networks have been around forever, I should point out that in all cases we're talking about networks which, in principle, should allow meaningful and useful remote logins and timely transfers of substantial amounts of data.

ONet has a short but interesting history. When the Ontario government announced, selected, and then funded a number of research "Centres of Excellence," a couple of them decided to consider setting up a network of modest (9600 bps) bandwidth among their constituents. The network would use TCP/IP (Transmission Control Protocol/ Internet Protocol), widely used to connect UNIX systems on our campus and in general, and the protocol used in the ARPAnet and NSFNet, two extensive US networks. There was a thought that, with a bit of assistance from the appropriate central computing organizations, a more public network connecting campus network to campus network (as opposed to machine to machine) would be established. This type of connection would be of use to anyone on a campus network, as well as the Centres' users, and the Centres would pay for a substantial amount of its cost. At the time, the Centres involved decided that this type of shared connection might not give them the assured performance they needed, and decided to set up a private network.

Having had their appetites whetted by the prospects of a pervasive intercampus TCP/IP network, a number of the directors of computing from various universities have decided to establish a TCP/IP network on their own hook, from their own internal financial resources. The original members are Toronto, Western, York, MacMaster, Waterloo, and Queens. Guelph is expected to join soon and, interestingly enough, the two Centres of Excellence that started the ball rolling in the first place are joining as well. Other hot prospects are Carleton and a few government departments. The original planned bandwidth was 9600 bps. However, the Ontario Centre for Large Scale Computing (OCLSC) has come in as a major partner and funder, and has agreed to cover the additional cost needed to upgrade the bandwidth, of at least the initial members, to 19.2 Kbps. The network uses a cisco (small c) router connected to each campus network, communicating via Bell circuits. It is pretty straightforward and does not require an "operator" per se, but simply a group of cooperating institutions. It is fairly realistic to contemplate this network eventually expanding to all Ontario universities, though perhaps at varying bandwidths. In addition to TCP/IP, limited DECNET connectivity is also a possibility. Development work is nearly completed in the US for the software which would allow NetNorth traffic (called IBM RSCS) to be carried on TCP/IP-based networks; when this is available, Ontario NetNorth traffic could use ONet (another source of funds!). The charging algorithm applied at present is to simply take the total communications charges and divide them by the number of member institutions. There are aberrations for pre-existing connections such as those between McMaster and us (U of T) and York and us, but the algorithms are fair and defensible. As the network expands to institutions which are farther away, some adjustment in the charging may be required.

The network, for now, is more or less centred on Toronto. Waterloo, Queens, McMaster, and York are all directly connected to Toronto. There are a couple of reasons for this. This topology minimizes the response time a user will experience because of multiple hops. The reason why this is important in getting to Toronto is because much of the initial use will

[This article is not subject to editorial review.]

be in accessing the Cray supercomputer. The second reason is that we have installed a 56 Kbps connection to Cornell and the US NSFNet, and direct connections to us minimize the number of hops to this connection.

The beauty of this type of network is that, once all the interconnections are in place, a person's terminal connected in some way to a given campus network can access, in pretty intimate form, resources such as machines or databases on another university's campus network. Ultimately, the other campus networks simply become a logical (and in most senses a physical) extension of the user's local environment. There are a couple of limitations which make the extension less than perfect. The first and most obvious is simply the amount of bandwidth that we can afford between campuses. It is generally much less than that which is available on a campus backbone network. The second is the lack of standardization (and even knowledge) of the application user interfaces across systems from different vendors on different campuses.

In solving these problems, more bandwidth is one you just throw money at. As long as the CRTC (Canadian Radio and Telecommunications Commission) continues its tight control on telecommunications tariffs and its policy of very limited deregulation and competition, there is little relief in sight.

The problem of useful, pervasive application interfaces is considerably more complicated, as I have tried to illustrate. It may be partially solved, at least for future systems, by a set of standards developed and promulgated by the International Standards Organization (ISO) called Open Systems Interconnect (OSI). These standards apply to a whole stack of layers of function which facilitate your communication with another person or application. The upper layers are the ones which are immediately visible to you as a user, and the ones where a lack of standards may stand in the way of a transparent user-friendly interface to an application. The standards are slowly being adopted by vendors, but the problem is that the lower, more primitive (maybe elemental is a better description) layers are being adopted first, and these are the ones of least use (certainly least visibility) to a user on a network. The use of OSI standards as the solution to the simple interconnection problem may not be very far off. We, in fact, would anticipate that ONet would be running some form of lower level OSI protocols fairly shortly, even if only in parallel with TCP/IP. These standards are expected to eventually replace the TCP/IP protocol layers of ONet and other TCP/IP networks at some point. The use of the higher level OSI standards as the solution to the application communication and user interface problem is a lot further off. For quite a while we will have to write user-friendly interfaces, or hope that a remote resource is similar to a local one the user is familiar with.

As an example, the Library Catalog Systems at York, Guelph, and Toronto are all from different vendors, with different user interfaces and different possible search strategies. In addition, they run on different hardware, with different communications and interconnection capabilities. However, in spite of all this, they exist to meet the same basic needs and to supply the same basic service, and there is considerable utility in users from any of the campuses being able to access the joint catalog of all the libraries. This is still true even if the only way this access can be accomplished is one system at a time. Substantial amounts of work are needed on each system in order for a user on one to easily be able to connect to and use one of the others. We are actually starting to assist our library with the communications aspects of such access, to help them to try to accomplish something like this, in pilot form, with York and Queens. But that's another tale...

In conclusion, ONet is not perfect, but it's a good start. It's grass roots, nongovernment (or at least far enough removed that government control is not an issue), should be able to evolve with emerging standards, and has a number of applications just waiting for full implementation. It is usable now, try it!

Institutions that need information on joining ONet can call Warren Jackson at (416) 978-8948 or send e-mail to wcj@vm.utcs.utoronto.ca. For information on using ONet, contact your local systems administrator.

AppleTalk Gateway Improves Computer Communications

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Any workgroup or department on campus that uses Macintoshes and/or IBM PCs and/or UNIX machines (on Ethernet) will be interested in a gateway now being tested at UTCS. Using the trial system at our Bancroft Avenue location, it is now possible for Macintosh computers and IBM PCs to connect to the resources of the Ethernet Network and to share laser printer resources.

This gateway is a Kinetics FastPath Box connecting an AppleTalk network to Ethernet. One useful function of this setup is that it gives Macintosh users access to mainframe storage devices. For example, it is now possible to have a 230 megabyte (MB) UNIX hard disk appear as a disk on your Macintosh desktop. This means that you can simply move files to and from that hard disk, or open files in that hard disk, just as if that disk were installed inside your Macintosh. The advantage of this Macintosh-to-mainframe connection is, that for some applications, you can use the mainframe without actually learning the mainframe operating system.

In addition, using this system, machines on AppleTalk can link with thousands of other computers through INTERNET. It is possible to have interactive sessions between any computers on INTERNET, to transfer data between them, and to also use different forms of electronic mail between them.

A cost-saving advantage is that, through this one Kinetics FastPath Box, a group of Macintoshes can connect to the campus-wide Ethernet without the expense of individual connections for each machine. This is also advantageous because AppleTalk transmits information much more quickly than standard serial connections. For example, a 10MB print file takes about 3 hours to transmit over standard computer terminal lines, while on AppleTalk it takes about 12 minutes.

Using this setup, you can also share printer resources. Macintoshes can always share laser printers through AppleTalk, but with the FastPath Box, those same machines can send print files directly from any application (such as Microsoft Word or PageMaker) to printers connected to a mainframe computer. This gives the user on Appletalk the advantage of queuing print jobs and of sharing printer resources across various environments.

This same benefit applies to mainframe users because AppleTalk connections can be made from a mainframe computer to laser printers on AppleTalk. This means that UNIX will send data over AppleTalk to laser printers shared with Macintoshes. The benefits of this setup can also apply to IBM PCs and compatibles if those PCs are fitted with AppleTalk boards. This is a relatively simple way to get improved communications between computers and with peripherals such as laser printers.

For more information on or a demonstration of this AppleTalk gateway, contact Advising Services at 978-HELP.

QuickMail for the Macintosh

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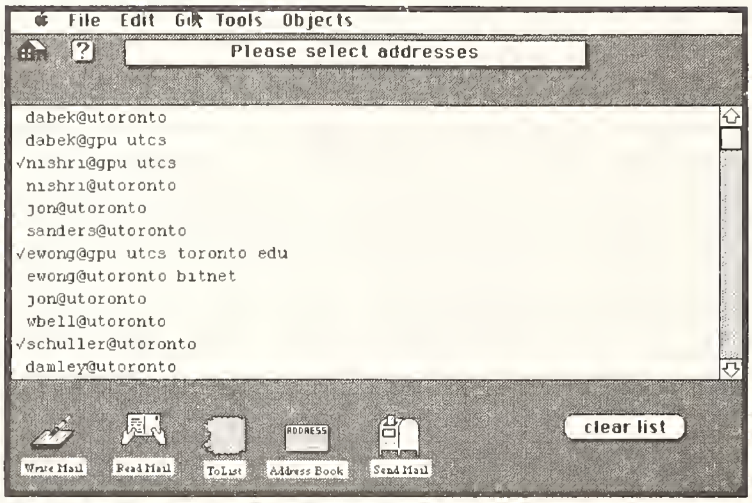
If you have access to a Macintosh microcomputer that is connected to other Macintoshes through AppleTalk, then you may be interested in a new electronic mail (e-mail) program available at UTCS.

E-mail packages have become quite popular over the last few years. Many users of computers that are connected to the mainframe networks have grown accustomed to receiving a significant portion of their daily communication in electronic form. Microcomputer users have, to some extent, been enjoying the benefits of e-mail because a great number of micros are linked to the minicomputers and mainframes that run the e-mail packages. The academic community has been using INTERNET through such mainframe connections.

But experience has shown that microcomputer users are faced with some difficulties when first introduced to the world of "networked computing." This is especially true of Macintosh users, who are generally less familiar with the command-based operating systems usually found on mainframes. To use the mainframe e-mail packages, Macintosh users must learn a new and somewhat "user-hostile" operating system.



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sanders@utoronto
√ewong@gpu utcs toronto edu
ewong@utoronto bitnet
jon@utoronto
wbell@utoronto
√schuller@utoronto
damley@utoronto

Figure 1: shows a sample screen of the prototype HyperCard stack used to access UNIX e-mail

In our attempts to address this problem, we sought to give Macintosh users direct e-mail access in their own environment without requiring that they learn CMS or UNIX, the two most widely used mainframe operating systems on this campus. We investigated commercially available solutions, but when we first started looking two years ago, the only two Macintosh e-mail programs — *InBox* from Think Technologies and *InterMail* from INTERNET Inc. — were found to be unsuitable.

In the spring of 1988, we decided to prototype a Macintosh e-mail package that would suit our requirements. We used HyperCard as our prototyping tool and within three months we were able to produce a HyperCard application, called a stack, which acted as a friendly "front end" to the UNIX e-mail system.

Figure 1 shows a sample screen of the HyperCard stack used to access UNIX e-mail.

Several problems became apparent during our experiment. The stack was unacceptably slow, and the modal aspect of HyperCard prevented us from using multiple windows onscreen. Our only alternative, then, was to rewrite the stack in Pascal or C, two conventional Macintosh programming languages. This would have required a large development effort by people at UTCS, an effort which we were not prepared to initiate.

In the autumn of 1988 we tested a beta version of QuickMail, a new e-mail package from CE Software. The most exciting feature of QuickMail was that it allowed us to write our own gateways to other e-mail systems. We proceeded to write a gateway that functions as a link between e-mail on UNIX and QuickMail on the Macintosh. UNIX, in turn, is connected to the campus networks and the international networks such as NetNorth/BITNET, INTERNET, USENET, and so on. This means that mail sent from Macintosh QuickMail can be received by any computer linked to campus or international networks, and vice versa.

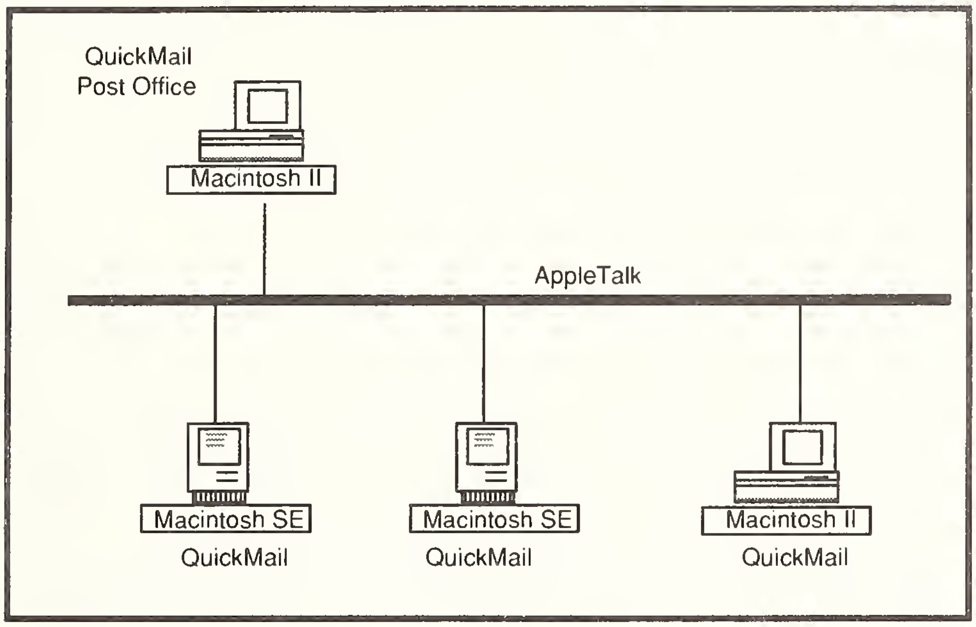


Figure 2: sample QuickMail set up on AppleTalk

To use QuickMail

QuickMail is a desk accessory for sending and receiving e-mail. As supplied, you can only receive mail on Macintoshes connected through AppleTalk. One Macintosh in the AppleTalk network must serve as the "Post Office," holding mail until it is read (see *Figure 2*).

To use the QuickMail e-mail gateway that we have written, a department would install a special program, supplied by UTCS, on its QuickMail Post Office machine. The department would also have to obtain either a Kinetics FastPath Box or a Gaterbox (see *Figure 3*). These devices serve to link the campus Ethernet networks to a department's local AppleTalk network (for more on this link to Ethernet, see the article on page 3).

A cooperating UNIX system must then run CAP, the Columbia AppleTalk Protocol, which is available free of charge. CAP is the actual vehicle which transfers mail between UNIX and the Macintosh QuickMail Post Office.

UTCS Site License For QuickMail

We want to encourage Macintosh users on campus to get involved with QuickMail as an alternative to both

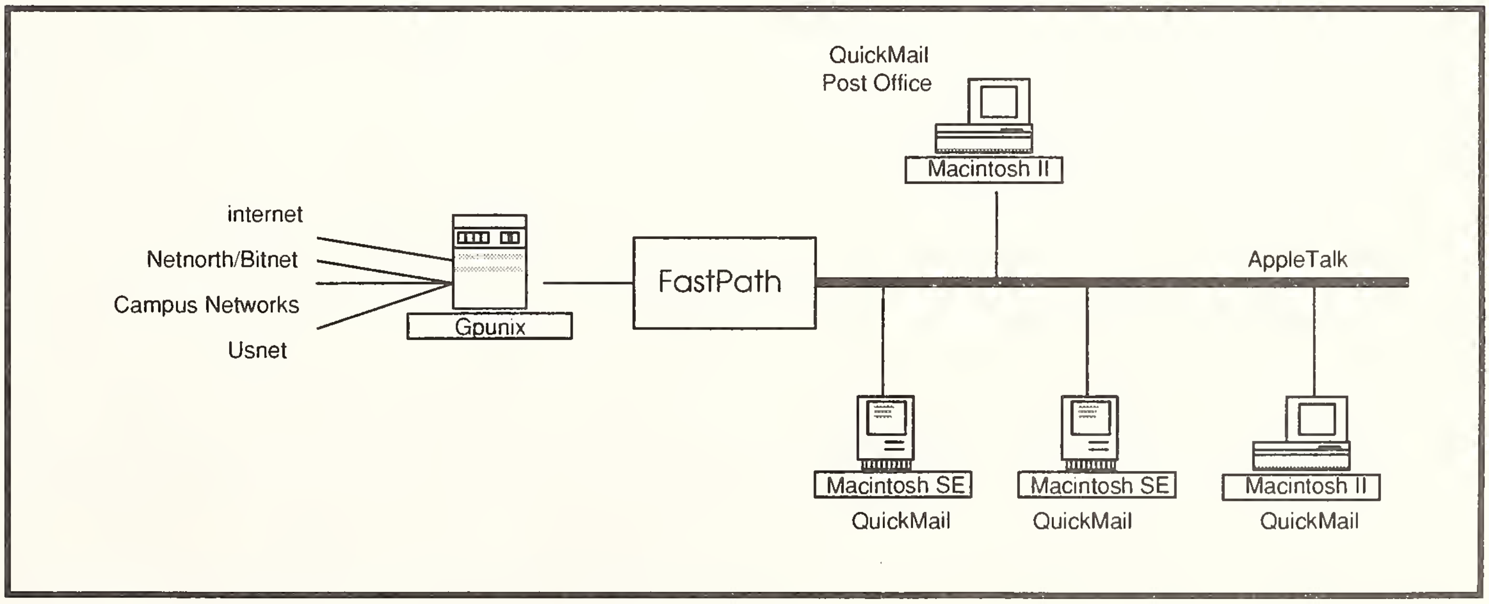
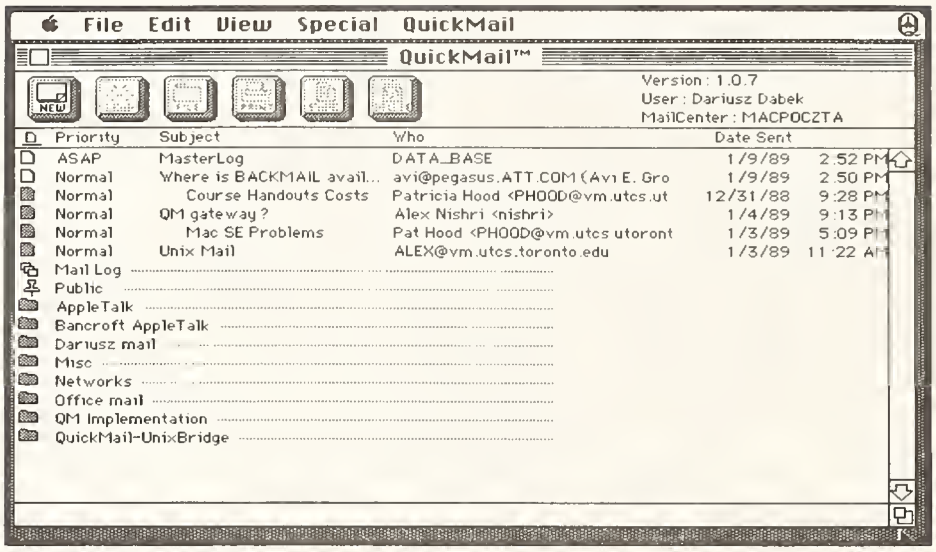


Figure 3: AppleTalk connects to international networks

UNIX and CMS e-mail. UTCS has obtained a site licence for the QuickMail package from CE Software so that we can provide the program to users at the University of Toronto for a very reasonable fee.

The UNIX software bridge that we have written will be available for beta testing by the time you read this article. If you are interested in participating in the beta test, or if you have any questions regarding QuickMail, please feel free to contact Dariusz Dabek by telephone at 978-8823.



Version : 1.0.7
User : Dariusz Dabek
MailCenter : MACPOCZTA

Priority	Subject	Who	Date Sent	
ASAP	MasterLog	DATA_BASE	1/9/89	2:52 PM
Normal	Where is BACKMAIL avail...	avi@pegasus.ATT.COM (Avi E. Gro	1/9/89	2:50 PM
Normal	Course Handouts Costs	Patricia Hood <PHOOD@vm.utcs.ut	12/31/88	9:28 PM
Normal	QM gateway ?	Alex Nishri <nishri>	1/4/89	9:13 P
Normal	Mac SE Problems	Pat Hood <PHOOD@vm.utcs.utoront	1/3/89	5:09 P
Normal	Unix Mail	ALEX@vm.utcs.toronto.edu	1/3/89	11:22 A

Mail Log
Public
AppleTalk
Bancroft AppleTalk
Dariusz mail
Misc
Networks
Office mail
QM Implementation
QuickMail-UnixBridge

QuickMail Screen

ProComm Communications Program Seminar

April 15, 1989
9:00 - 11:00 a.m.

ProComm is a general purpose communications program currently available to all U of T faculty, staff, and students. It is suitable for connecting to the many networks on campus.

A seminar has been scheduled to introduce ProComm and its various features: terminal emulation (a number of popular ones will be reviewed); the dialing directory; file transfer protocols, such as Kermit and XMODEM; configuration and modem parameter settings; and the DOS gateway, which allows you to execute DOS commands and other programs while you are still in ProComm.

There is a fee for this seminar. Copies of ProComm are made available at no charge to members of the University, but you must bring your own diskettes (two 5.25" or one 3.5").

To reserve a place in this seminar, please contact Irene Rosiecki at 978-4565.

Free NetNorth (Electronic Mail) Demonstration

April 15, 1989
11:00 - 12:30 noon

Anyone interested in sending documents to colleagues or friends reliably, quickly, and inexpensively will not want to miss this demonstration. We will introduce you to the NetNorth/BITNET/EARN communications network, which is accessible from the CMS system. This network connects more than a thousand universities and research institutes in Europe, Asia, and North America. Sending documents or files over the network is very easy to learn.

The demonstration will last just over an hour. Included will be how to send mail and files to another institution, and how to talk directly to someone on the network. ***Please note this is a demonstration only.***

Space is limited. If you would like to attend one of these sessions, please contact Irene Rosiecki at 978-4565 to reserve a place.

PC Education Facility Upgrade

Terry Sanderson
sanders@gpu.utcs.utoronto.ca

In December, the UTCS Information Centre took delivery of new state-of-the-art microcomputers for the PC Education Facility. The new equipment, obtained with the generous assistance of AT&T Canada Inc., will enable UTCS to offer courses on the most current software packages.

Replacing the ten aging IBM PC-XT's in the Education Facility will be AT&T 6386 WGS microcomputers. Based on 16 Megahertz Intel 80386 microprocessors, each machine is equipped with 1 megabyte (MB) of RAM, a 1.2MB floppy disk drive, an AT&T EGA adapter, an enhanced color monitor, an enhanced keyboard, and a mouse. The machines are connected to the file server by AT&T Starlan Network adapters.

The file server, an AT&T 3B2/400 (based on the WE32100 processor), uses UNIX System V as its native operating system. Equipped with 4MB of RAM, two 72MB hard disks, a 60MB streaming tape drive, a WE32106 math acceleration unit, a 3B2 Starlan Network adapter, and 8 high-speed serial ports, the machine acts as a DOS file server through the Starlan Network 3B2 DOS Server Program. This program enables the 3B2 to function as a file and print server for the MS-DOS machines connected through the Starlan Network, storing the files in DOS format and making filename conversions where necessary.

Rounding out the network is an instructor's machine (another 6386), equipped with a 135MB hard disk, and one 1.2MB and one 1.44MB floppy disk drive. This machine can operate as a backup server to the network in situations where the 3B2 is not available. Also attached to the instructor's machine is a Sharp QA-50 Projection Panel. This liquid crystal display panel is used on an overhead projector, allowing the students to see a wall-screen view of the display on the instructor's monitor.

We believe that this new equipment will benefit both the instructors and the students by enabling us to present information more effectively. For more information on the new hardware setup or the courses offered in the PC Education Facility, please telephone Irene Rosiecki at 978-4565.

Virus Alert

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Dariuz Dabek dabek@vm.utcs.utoronto.ca

A virus has been found on some UTCS Macintoshes. All customers who have received Macintosh software from UTCS between December 1, 1988 and January 16, 1989 should stop using it immediately and return it to UTCS to have it checked for the virus.

If the application has been infected, UTCS will provide the tools to help resolve the problem. Customers unsure of how to use the tools should call Advising Services at 978-HELP for assistance.

TACT – A Text Retrieval Program

John Bradley
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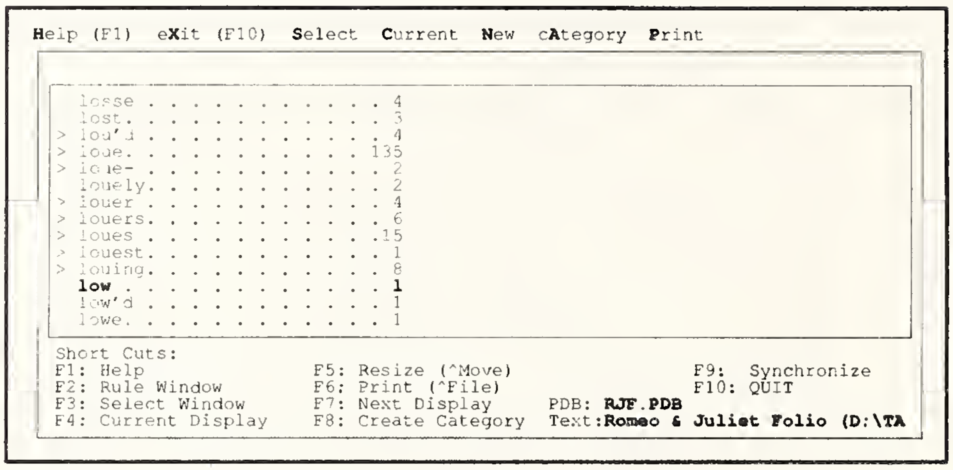
The history of TACT's development reflects the close cooperation between UTCS and U of T's humanities community, a community which is now represented in part by the Centre for Computing in the Humanities (CCH). TACT is designed by John Bradley (of UTCS), and much of the detailed programming and coding is done by UTCS' "humanities programmer," Lidio Presutti, who has been assigned to this project by the CCH's Software Development Committee.

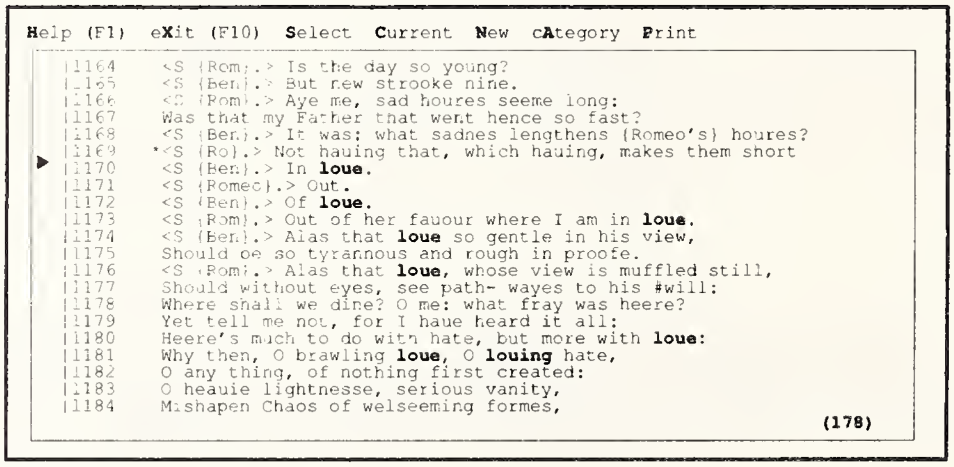
What is TACT? Like "The Word Processor" and "Word Cruncher", it is a text retrieval program (for more on text retrieval programs, see the accompanying articles on pages 11 and 13). While TACT is still being developed, we expect that Version 1.0 will be available to the humanities community in the summer of 1989. It will be public domain software and will run on IBM PCs or compatibles. Let us look at some examples where TACT is used for analyzing text.

Figure 1 shows TACT working on the folio text of Shakespeare's *Romeo and Juliet*. The top line on the screen is a Menu Bar that you use to activate TACT's features. Like many programs being developed today, TACT's display model is inspired by the Apple Macintosh or Microsoft Windows (although a mouse is not needed to use TACT). In addition, the screen can be divided into windows which can show different displays simultaneously. *Figure 1* has a window in the middle of the screen that contains an excerpt of the vocabulary that TACT has found in the text of *Romeo and Juliet* note



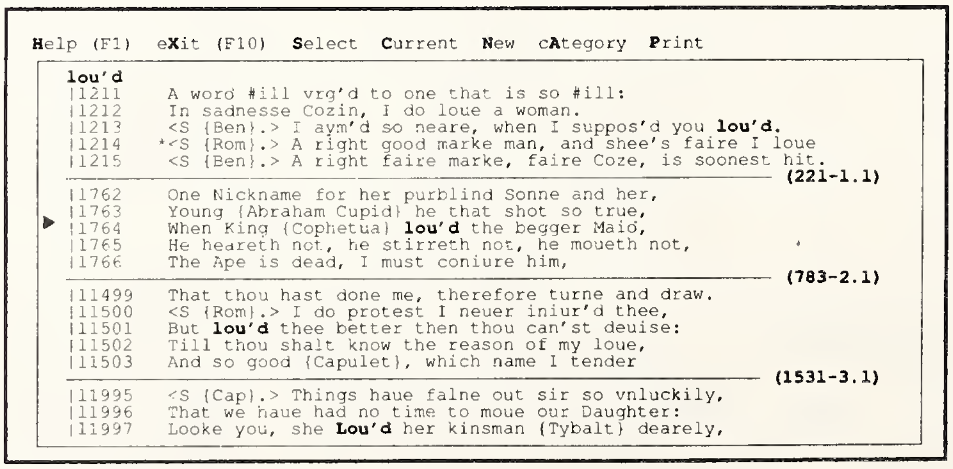
```
Help (F1)  eXit (F10)  Select  Current  New  cAtegory  Print

   losse . . . . . . . . . . . . 4
   lost. . . . . . . . . . . . . 3
 > lou'd . . . . . . . . . . . . 4
 > loue. . . . . . . . . . . . 135
 > loue- . . . . . . . . . . . . 2
   louely. . . . . . . . . . . . 2
 > louer . . . . . . . . . . . . 4
 > louers. . . . . . . . . . . . 6
 > loues . . . . . . . . . . . .15
 > louest. . . . . . . . . . . . 1
 > louing. . . . . . . . . . . . 8
   low . . . . . . . . . . . . . 1
   low'd . . . . . . . . . . . . 1
   lowe. . . . . . . . . . . . . 1
 Short Cuts:
 F1: Help               F5: Resize (^Move)                 F9:  Synchronize
 F2: Rule Window        F6: Print (^File)                  F10: QUIT
 F3: Select Window      F7: Next Display      PDB: RJF.PDB
 F4: Current Display    F8: Create Category   Text:Romeo & Juliet Folio (D:\TA
```

Figure 1.



```
Help (F1)  eXit (F10)  Select  Current  New  cAtegory  Print
   |1164    <S {Rom}.> Is the day so young?
   |1165    <S {Ben}.> But new strooke nine.
   |1166    <S {Rom}.> Aye me, sad houres seeme long:
   |1167    Was that my Father that went hence so fast?
   |1168    <S {Ben}.> It was: what sadnes lengthens {Romeo's} houres?
   |1169   *<S {Ro}.> Not hauing that, which hauing, makes them short
 ▶ |1170    <S {Ben}.> In loue.
   |1171    <S {Romeo}.> Out.
   |1172    <S {Ben}.> Of loue.
   |1173    <S {Rom}.> Out of her fauour where I am in loue.
   |1174    <S {Ben}.> Alas that loue so gentle in his view,
   |1175    Should be so tyrannous and rough in proofe.
   |1176    <S {Rom}.> Alas that loue, whose view is muffled still,
   |1177    Should without eyes, see path- wayes to his #will:
   |1178    Where shall we dine? O me: what fray was heere?
   |1179    Yet tell me not, for I haue heard it all:
   |1180    Heere's much to do with hate, but more with loue:
   |1181    Why then, O brawling loue, O louing hate,
   |1182    O any thing, of nothing first created:
   |1183    O heauie lightnesse, serious vanity,
   |1184    Mishapen Chaos of welseeming formes,
                                                                  (178)
```

Figure 2.



```
Help (F1)  eXit (F10)  Select  Current  New  cAtegory  Print
   lou'd
   |1211    A word #ill vrg'd to one that is so #ill:
   |1212    In sadnesse Cozin, I do loue a woman.
   |1213    <S {Ben}.> I aym'd so neare, when I suppos'd you lou'd.
   |1214   *<S {Rom}.> A right good marke man, and shee's faire I loue
   |1215    <S {Ben}.> A right faire marke, faire Coze, is soonest hit.
   ____________________________________________________________ (221-1.1)
   |1762    One Nickname for her purblind Sonne and her,
   |1763    Young {Abraham Cupid} he that shot so true,
 ▶ |1764    When King {Cophetua} lou'd the begger Maid,
   |1765    He heareth not, he stirreth not, he moueth not,
   |1766    The Ape is dead, I must coniure him,
   ____________________________________________________________ (783-2.1)
   |11499   That thou hast done me, therefore turne and draw.
   |11500   <S {Rom}.> I do protest I neuer iniur'd thee,
   |11501   But lou'd thee better then thou can'st deuise:
   |11502   Till thou shalt know the reason of my loue,
   |11503   And so good {Capulet}, which name I tender
   ___________________________________________________________ (1531-3.1)
   |11995   <S {Cap}.> Things haue falne out sir so vnluckily,
   |11996   That we haue had no time to moue our Daughter:
   |11997   Looke you, she Lou'd her kinsman {Tybalt} dearely,
```

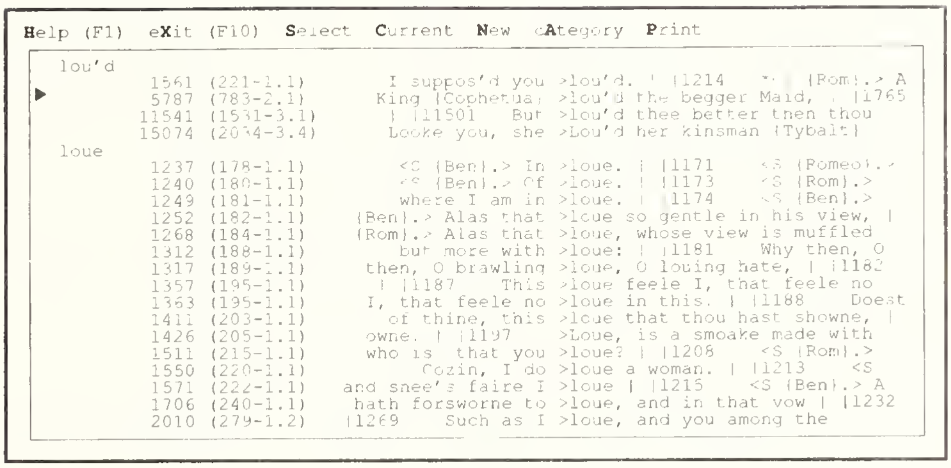
Figure 3.

that the spelling in the folio text reflects Elizabethan spelling conventions: "loue" was then the spelling for "love"). The display consists of a series of lines showing one word per line and the corresponding number of occurrences of that word in the text. Using TACT, you can browse through this vocabulary list and select words that you would like to examine further.

In *Figure 1* we have selected various forms of the word "love" ("loue") — angle brackets point to the forms we selected. Next, we ask TACT to show us the positions in the text that contain these selected word forms. *Figure 2* shows a typical result. The words marked in bold are the occurrences TACT has found. By pushing the page-up or page-down keys, you can jump through the text to see other occurrences.

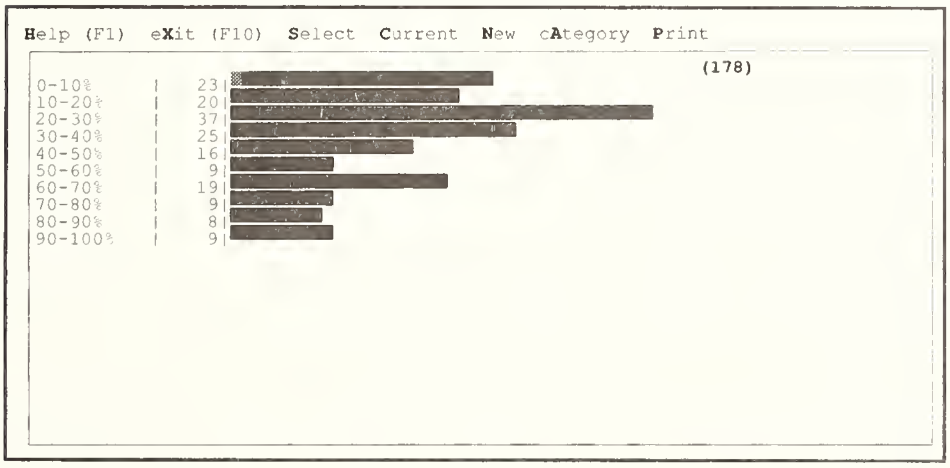
TACT can also show you the selected positions in the text in several other forms (an example is shown in *Figure 3*). The "KWIC" format (KWIC stands for "Key Word In Context") shows you short excerpts from each occurrence on the screen. In the example, we see, for each occurrence, the line containing the text plus two lines above and below. We could also choose to see a greater range of occurrences on the screen at the same time. *Figure 4* shows a single line excerpt, with the selected word centered within the line.

In addition, TACT can plot simple distributions. *Figure 5* shows the distribution of the forms of the word "love" across the entire text. Notice that a significant number of occurrences of this word appear between



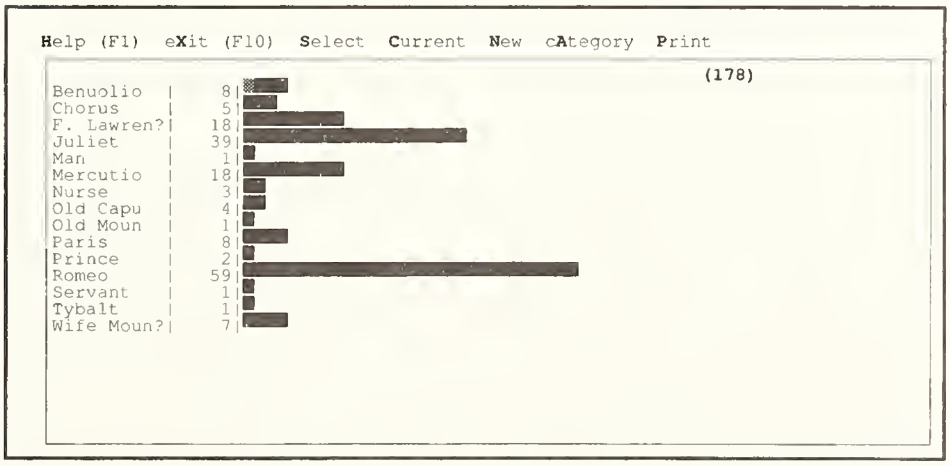
```
Help (F1)  eXit (F10)  Select  Current  New  cAtegory  Print

 lou'd
          1561  (221-1.1)     I suppos'd you >lou'd. | |1214   <S {Rom}.> A
 ▶        5787  (783-2.1)   King {Cophetua} >lou'd the begger Maid, | |1765
         11541  (1531-3.1)    | |11501   But >lou'd thee better then thou
         15074  (2034-3.4)    Looke you, she >Lou'd her kinsman {Tybalt}
 loue
          1237  (178-1.1)     <S {Ben}.> In >loue. | |1171    <S {Romeo}.>
          1240  (180-1.1)     <S {Ben}.> Of >loue. | |1173    <S {Rom}.>
          1249  (181-1.1)     where I am in >loue. | |1174    <S {Ben}.>
          1252  (182-1.1)  {Ben}.> Alas that >loue so gentle in his view, |
          1268  (184-1.1)  {Rom}.> Alas that >loue, whose view is muffled
          1312  (188-1.1)      but more with >loue: | |1181    Why then, O
          1317  (189-1.1)   then, O brawling >loue, O louing hate, | |1182
          1357  (195-1.1)    | |1187    This >loue feele I, that feele no
          1363  (195-1.1)   I, that feele no >loue in this. | |1188    Doest
          1411  (203-1.1)    of thine, this >loue that thou hast showne, |
          1426  (205-1.1)   owne. | |1197    >Loue, is a smoake made with
          1511  (215-1.1)   who is  that you >loue? | |1208    <S {Rom}.>
          1550  (220-1.1)        Cozin, I do >loue a woman. | |1213    <S
          1571  (222-1.1)  and snee's faire I >loue | |1215    <S {Ben}.> A
          1706  (240-1.1)  hath forsworne to >loue, and in that vow | |1232
          2010  (279-1.2)  |1269    Such as I >loue, and you among the
```

Figure 4.



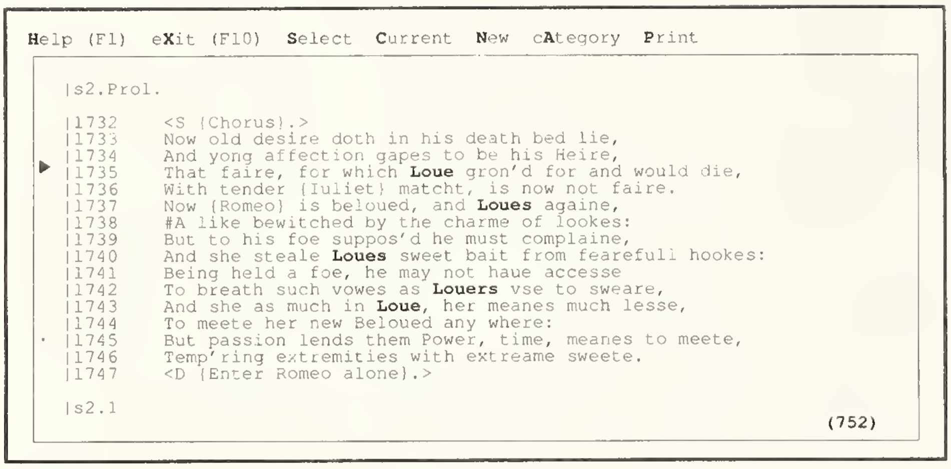
```
Help (F1)  eXit (F10)  Select  Current  New  cAtegory  Print
                                                    (178)
0-10%     |  23|
10-20%    |  20|
20-30%    |  37|
30-40%    |  25|
40-50%    |  16|
50-60%    |   9|
60-70%    |  19|
70-80%    |   9|
80-90%    |   8|
90-100%   |   9|
```

Figure 5.



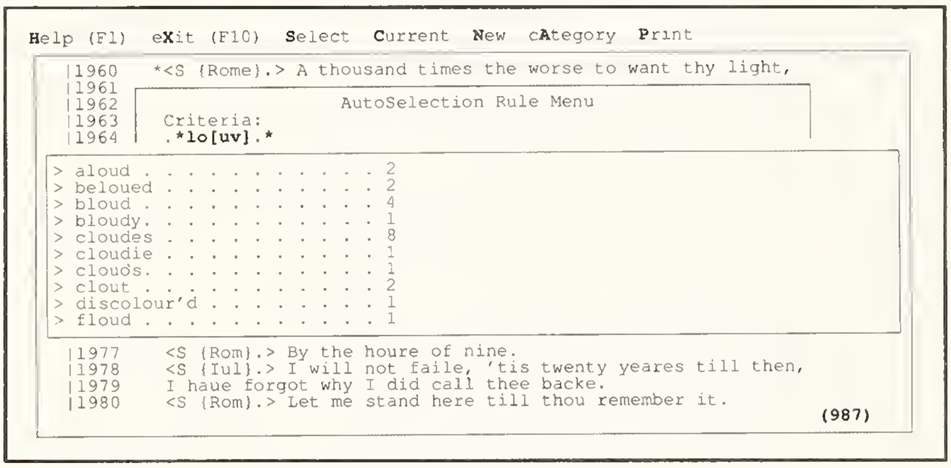
```
Help (F1)  eXit (F10)  Select  Current  New  cAtegory  Print
                                                    (178)
Benuolio   |   8|
Chorus     |   5|
F. Lawren?|  18|
Juliet     |  39|
Man        |   1|
Mercutio   |  18|
Nurse      |   3|
Old Capu   |   4|
Old Moun   |   1|
Paris      |   8|
Prince     |   2|
Romeo      |  59|
Servant    |   1|
Tybalt     |   1|
Wife Moun?|   7|
```

Figure 6.


Help (F1) eXit (F10) Select Current New cAtegory Print

```
 |s2.Prol.

 |1732    <S {Chorus}.>
 |1733    Now old desire doth in his death bed lie,
 |1734    And yong affection gapes to be his Heire,
▶|1735    That faire, for which Loue gron'd for and would die,
 |1736    With tender {Iuliet} matcht, is now not faire.
 |1737    Now {Romeo} is beloued, and Loues againe,
 |1738    #A like bewitched by the charme of lookes:
 |1739    But to his foe suppos'd he must complaine,
 |1740    And she steale Loues sweet bait from fearefull hookes:
 |1741    Being held a foe, he may not haue accesse
 |1742    To breath such vowes as Louers vse to sweare,
 |1743    And she as much in Loue, her meanes much lesse,
 |1744    To meete her new Beloued any where:
·|1745    But passion lends them Power, time, meanes to meete,
 |1746    Temp'ring extremities with extreame sweete.
 |1747    <D {Enter Romeo alone}.>

 |s2.1
                                                          (752)
```

Figure 7.


Help (F1) eXit (F10) Select Current New cAtegory Print
AutoSelection Rule Menu

```
|1960   *<S {Rome}.> A thousand times the worse to want thy light,
|1961
|1962                     AutoSelection Rule Menu
|1963    Criteria:
|1964    .*lo[uv].*
> aloud . . . . . . . . . . . 2
> beloued . . . . . . . . . . 2
> bloud . . . . . . . . . . . 4
> bloudy. . . . . . . . . . . 1
> cloudes . . . . . . . . . . 8
> cloudie . . . . . . . . . . 1
> clouds. . . . . . . . . . . 1
> clout . . . . . . . . . . . 2
> discolour'd . . . . . . . . 1
> floud . . . . . . . . . . . 1
|1977   <S {Rom}.> By the houre of nine.
|1978   <S {Iul}.> I will not faile, 'tis twenty yeares till then,
|1979   I haue forgot why I did call thee backe.
|1980   <S {Rom}.> Let me stand here till thou remember it.
                                                          (987)
```

Figure 8.

20% and 30% of the way through the text. TACT can do other types of distributions as well. *Figure 6* shows the frequency of the selected words used by the characters in the play — Benuolio uses one of the words 8 times while Romeo uses it 59 times.

In TACT, the various displays are linked together. To illustrate this, suppose you wanted to see the text where the chorus in *Romeo and Juliet* uses the selected words. Each horizontal column in the distribution display *(Figure 6)* is made up of boxes, each of which represents an occurrence. One of the boxes will be highlighted (shown in a light grey in Benuolio's column). You can use the PC's cursor keys to move the highlighted box along the column or between columns. To view the first occurrence of one of the words spoken by the chorus, you would move the highlight to the first box in the chorus' distribution line. Now, by pushing a key you can ask TACT to display the corresponding position in the text where this selection occurs. The result is shown in *Figure 7* .

In addition to selecting positions from the vocabulary, you can ask TACT to do some selecting for you. For example, to ask TACT to find all words that contain the characters "lo" followed by either "u" or "v", the regular expression-like construct ".*lo[uv].*" can be used. With the words it finds, TACT will produce a list similar to that shown in *Figure 8*.

Most of the words in the list (only partially visible in the window) have nothing to do with love, of course, but one — "beloued" — perhaps should be included in a list of words having to do with love. Because of its prefix, it could easily be missed in a simple selection from the vocabulary list.

TACT can do other types of selections for you. For example, you could ask it to select only occurrences of the "love" words in the first 3 acts, or only in places where they occur with other words (such as the words "Romeo" or "Juliet" in a single speech).

Because TACT is still in development, we would be interested in hearing from you. We may still be able to make adjustments to its form to accommodate your needs. If you are interested in learning more about TACT or you would like to make a comment about it, please contact John Bradley at 978-3995 or Lidio Presutti at 978-5130.

Beyond Word-Processing: Searching & Analyzing Text

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Easy-to-use word-processing packages have drawn many people into computing in recent years. Both students and professors have discovered that computers allow storage, formatting, and manipulation of text, enabling them to create essays, reports, articles, books, and so on.

But what do you do when multiple text files begin to accumulate on your system and you want to keep the contents of these files accessible for your day-to-day use? If you have a microcomputer with a hard disk, it is easy to have so many files that you lose track of files or forget what is in some of them. It is a labour-intensive task to create indexes of multiple files or of the contents of individual files (this latter task can be accomplished in some word-processing packages, but it may take a lot of work and be prone to error). Maintaining control of your information becomes even more challenging as you add reference works such as the plays of Shakespeare, or the Bible, or the results of database searches to your collection of files. Not only is it difficult to organize and properly use multiple files, it is also a problem to analyze a large work and break it down into its composite parts.

Fortunately, programs do exist that take advantage of the computer's power to read and manipulate large numbers of words. These help users to view and analyze large text files (called textbases) and groups of files. Most of these programs fall under the umbrella term, *text analysis programs* (TAPs for short). Some TAPs are more specifically termed *text retrieval programs* (TRPs). Most people who use word processors already use rudimentary forms of text retrieval whenever they do a word-search in a document. TRPs are designed to help users search for blocks of text, retrieve them, manipulate them, and record where they are. When you use a TRP, you tell it which files to search in, which words or phrases to look for, and what to do when it finds the assigned text.

Send *Gopher* For Needed Words

An inexpensive but generally useful TRP is *Gopher* (by Microlytics, $69). This is recommended for locating misplaced files on a large hard disk, or for searching multiple files for similar passages or references. For example, suppose you are doing an essay on Shakespeare's uses of the term "fire", and you also want to investigate the biblical treatment of the same term. As long as you have the Bible and Shakespeare's writings on disk or CD-ROM, you can search relatively quickly for every occurrence of the selected term.

In the Gopher selection screen, you would choose which drive, directory, and files you want searched (you can search up to 500 files at a time, or send Gopher to search all files in all subdirectories). Gopher can open and search files created in over 30 popular software applications. Next, you would choose which words, partial words, or phrases to include in the search, and specify what you want Gopher to do when it finds an occurrence of the search pattern. For example, you might send a record of the search to a file or display the results on the screen. You can also modify these controls during a search.

Once you have chosen the options, you initiate the search; Gopher begins to scan your files at a rate of about one megabyte (MB) per minute on an AT-class computer (a little slower on an XT-class computer). When Gopher finds a pattern-match, it displays the found text with its location and context (you can then scroll up or down in the file). It also displays menu options which allow you to manipulate the file, change the search options, or mark a block of text for export to another file or to the file you are currently working on. A software reviewer for PC Magazine sent Gopher to find the term "Quattro" in the midst of 6.7MB of data on his hard disk. It found 8,762 occurrences in under four minutes. Gopher was highly recommended in the article (*PC Magazine*, December 13, 1988). Note that Gopher is classed as a nonindex-based program for searching text. This means it is not intended for heavy-duty word crunching but for simple "find" operations. To see how fast an index-based program searches (there is quite a difference), see *Crunching Words Quickly* following.

Professional Programs are Available

Programs such as Gopher could be handy for fetching necessary references from widely scattered sources, or simply for locating lost text. But for professional needs in the academic community, powerful text analysis programs are available. One such well-known program is Micro-OCP (for Oxford Concordance Program, published by Oxford Electronic Publishing — US$275). This is a sophisticated program for analyzing large or small texts in ASCII form (most word processors can save text in ASCII form). Using Micro-OCP to analyze a book or document, you can specify the creation of a concordance, index, word frequency list, or vocabulary statistics. Each of these options can be specifically tailored so, for example, you can find all words that occur less than ten times, you can delimit the part of the text to analyze (say, from Chapters seven to nine, or pages 50 to 77), or you can find all words with an "sh" ending, and so on.

"A Microcomputer Revolution"

Dr. Russ Wooldridge of the Department of French has a lot of experience with TRPs.

"I consider this [the advent of TRPs] to be a microcomputer revolution.

Crunching Words Quickly in Classics

Dr. Brad Inwood, Associate Professor of Classics, employs a text retrieval program to index and analyze works in ancient Greek. Using text downloaded from the *Thesaurus Linguae Graecae*, a 58 million word textbase of ancient Greek, Inwood's first major project was to set up and index the corpus of Plato on his AT-class microcomputer.

Preparing the text for indexing required a number of steps. Once he had the downloaded text in place on his hard disk (where it takes up 3.9 megabytes of space), he ran it through a transliteration program provided by Lidio Presutti of UTCS. Inwood then used character tables and sorting sequences developed by Dr. Robert Sinkewicz of the Pontifical Institute of Mediaeval Studies and, lastly, he went through the entire work and marked the reference levels by which the indexing program would organize the index. Books are commonly organized by book, chapter, and page, or major section, subsection, and so on, but Inwood used the divisions of "group of dialogues", "dialogue", and "page". Ideally he would have liked to break the pages into parts but found that this task would be far too labour-intensive.

"The people who created the database (*Thesaurus Linguae Graecae*) in the first place," Inwood explains, "could have made indexing far easier if they had only thought of pre-coding the text. The company that sells the indexing program that I use has obviously recognized this need and actually sells text already pre-coded with reference levels. The major drawback of Word Cruncher is that it cannot work without someone going in and coding the text."

Once the text was fully prepared, Inwood ran it through Word Cruncher, a text indexing and retrieval package (available for about US$300 from Electronic Text Corporation, 5600 North University Ave., Provo, Utah 84604, USA). He decided to use Word Cruncher over other packages, based on the recommendations of other users.

"The ability to work directly with ancient Greek text," Inwood continues, "was obviously a very important factor" (Word Cruncher can work with many languages including Hebrew, which is read from right to left).

Now that Inwood has an index of Plato's dialogues, he can look for words quite quickly. In a demonstration, the program found 2555 occurrences of *logos* (in 11 different grammatical forms — Word Cruncher is especially useful with highly inflected languages) in under ten seconds. Inwood then searched for another word and came up with 300 occurrences. He next combined the two lists, and told the program to find every occurrence where *logos* is found within 200 characters of the second word. The computer came back instantly with three occurrences.

"You cannot do searches like this with a printed concordance," Inwood concludes. "There is no way other than electronically to find these word associations. There is still a place for printed concordances, but they are not as fast or easy to use. Having this electronic index, I have discovered new ways to search text that never occurred to me when using printed concordances."

I have absolutely no use for a printed concordance anymore. A dynamic [computerized] concordance is 100 times better than a static [printed] one, as it puts the user in charge of how to search a document."

Wooldridge should know. Over the past eight years he has supervised the creation of a 20MB textbase containing a number of French literary texts and a main corpus of four large 16th and 17th century multilingual dictionaries from France. He has indexed this text with *Word Cruncher*, an indexing and retrieval program. The resulting 14MB index allows him to quickly refer to any word in the corpus. Wooldridge uses an AT-class microcomputer with two 40MB hard drives to work on his textbase.

"I installed the AT with one hard disk first, and recently found it necessary to add the second hard disk, " Wooldridge notes. "This setup frees me from the pain of using the mainframe."

Now, using his index, WordPerfect 4.2, and WordPerfect Library, he can switch into his textbase while working on a paper in WordPerfect, find what he needs, and copy material via the Library clipboard into his paper. It's no wonder he has no use for a printed concordance.

UTCS will have TACT

By the summer of this year, UTCS will have an indexing and retrieval program available for free public distribution. This program, called TACT, is a text retrieval system designed for use on text files in many languages. TACT is under development through a joint venture between the Centre for Computing in the Humanities and UTCS and is designed for academic work. TACT will offer some features that are unavailable on other software packages as well as providing the equivalent usefulness of packages that cost $300 or more.

For more information on TACT, see the article on page 8.

Textbases And Resources For Humanities Computing

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It is now possible to get large reference works off your library shelf and into your computer. For example, the first eleven volumes of the Oxford English Dictionary are available on two compact discs from Oxford University Press. The complete works of Shakespeare will come bundled with Steven Job's NeXT computer. Microsoft Corporation publishes a compact disc called Microsoft Bookshelf, "a CD-ROM reference library," which includes a dictionary, an almanac, and several other books.

Optical character readers, used for scanning pages of text in many languages into computer-readable form, make it economically viable to put works of literature and other reference works into electronic form. Many foreign-language texts are also available. For example, the *Responsa Retrieval Project* has put over 70 million words of Hebrew text into a globally accessible database. This textbase contains the Bible and hundreds of volumes of literature taken from sources spanning eight centuries. Using a program such as Micro-OCP or Word Cruncher (see preceding articles), you would have a tool to analyze textbases and glean material relevant to your research.

A Computerized Bible Program

Other programs are available that link a textbase with some form of text retrieval program (TRP), creating a dedicated software package. A good example of this is "The Word Processor" (TWP): the Bible and a text retrieval program combined. Available from Bible Research Systems (Suite 304, 2013 Wells Branch Parkway, Austin, Texas 78728, U.S.A.) for US$199, this is a multi-function program containing the full text of the Bible (several versions are available, without Apocrypha) and software for searching and manipulating the text. You can scroll through the text, or, if you select "reference" and enter a book, chapter, and verse, you can go to that location almost instantly. The "search" and "index" functions allow you to select words, phrases, or combinations of words, and have the program search the text for every verse containing a matching pattern. It can then display the references on the screen, or write them to a file (called an index). You can browse through the references in the index file and "open" any of those references, quickly putting you at that point in the text.

If you are working in a wordprocessor, you can also load a memory-resident utility called "typist". To insert a passage of scripture as you are writing a manuscript, you call the typist, which appears as a window on your screen. You can then browse or search through the Bible in this window, and import specified text into your document. There is also a function for creating "personal commentary" files. This allows you to link your own notes to biblical books.

Other utilities can be added for more serious study. "Instant access" (US$49) is a pre-searched index of every word in the Bible, enabling you to do word searches instantly. (Without instant access, it takes about one minute on an AT-class computer to search from the beginning of Genesis for a word occurring in the first book of the New Testament.) Two other utilities are Greek and Hebrew "transliterators" (US$199 each). These programs contain the King James Version of the Old or New Testament and the reference numbers from Strong's Exhaustive Concordance linking all English words with their appropriate Greek or Hebrew definition. You tap the F10 key to invoke the transliterator, and the verse shown at the top of the screen displays the reference number of each word. Select a word and you can get its definition (which can be edited). A "trace" option scans for relationships with other Greek or Hebrew words. A "word origin analysis" option lets you search for an English word and see the Greek or Hebrew origin of each occurrence of that word. You can also search for any Greek or Hebrew word (using its reference number) and show its differing English translations.

A text-specific program like this could possibly be of use to some researchers — if they need the text supplied by Bible Research Systems. But in academic computing, it may be more useful to invest in a program like Word Cruncher. Then you can analyze *any* text, not only the Bible. Our only reservation about TWP is that it functions as a closed system and yet costs as much as programs that work on any number of textbases. Below we look at a money-saving alternative to TWP.

Creating Your Own "Bible Program"

At the UTCS Information Centre, you can, at no charge, download the text of the Bible (King James Version) from our PC-SIG CD-ROM. (You will need seven 5.25 inch 360 kilobyte floppy disks.) Then, with a program like Word Cruncher (which is relatively expensive) or TACT (which will be distributed by UTCS at no charge), you could do sophisticated searches and forms of text analysis. This setup will not have all the features of TWP (especially the Greek/Hebrew programs), but you will be able to use TACT or Word Cruncher on all your text files. Finally, to round out this "personalized" package, an inexpensive program like Gopher (see previous article "Beyond Word-Processing") will let you import Bible text into your wordprocessor. As with TACT, an advantage of using Gopher is that it is not restricted to manipulation of the Bible — you can use it on all (or most of) your files.

Testing Gopher

We installed the free ASCII Bible along with Gopher on an AT-class microcomputer at UTCS and found that the two programs work quite well together. The ASCII Bible takes up 4.6MB on a hard disk, and Gopher can search for any word or pattern in about 4 minutes. A useful feature of Gopher is the ability to compress files to take up less room. We compressed the Bible with Gopher, freeing over 2.2MB of disk

Two Valuable Reference Works

Two notable books can supply you with information on resources available in humanities computing. One of them is *The Humanities Computing Yearbook* by Ian Lancashire and Willard McCarty (Volume 1 (1987), Oxford: Oxford University Press, 1988, 402 pp.). According to Willard McCarty of the University of Toronto's Centre for Computing in the Humanities, this jam-packed reference work "will be issued yearly as the name suggests. Each volume will be independent of the previous one and will contain notable listings (including some reviews and short descriptions) of articles, books, software, associations, projects, and the like." It is divided by subject area, containing 30 major sections and 230 minor sections on, among other topics, computational linguistics, creative writing (including fiction and poetry generators), editing and publishing, equipment (including optical scanners, workstations, etc.), medieval studies, music, natural languages and literatures (this section fills one quarter of the book), programming languages, religious studies, text analysis, and textbase management.

The U of T Bookroom lists *The Humanities Computing Yearbook* at US$59. The Yearbook will be available for review in the UTCS Information Office.

The other important book is called *Bits, Bytes & Biblical Studies* by John J. Hughes (Grand Rapids: Zondervan Publishing House, November 1987, 650 pp.). This large volume, according to Bits & Bytes Review (a highly informative humanities computing reference magazine), "provides moderately technical, extremely detailed reviews of a broad range of programs and products for academic computing." It "has been widely acclaimed by leading scholars in North America and Europe as the definitive, encyclopedic, and indispensable reference work in its field." While it may already be a little out-of-date in such a rapidly changing field, from the list of topics it seems that this is a thorough treatment of computer use in the Humanities generally, and in Biblical and Classical Studies specifically. For example, detailed reviews of dozens of products are given, including 32 word-processing programs, 9 text retrieval programs, 20 desktop publishing programs, 7 typesetting programs, 15 font editors, 17 high-resolution monitors, 20 Bible programs, 38 language learning programs, 23 archives, 10 machine-readable versions of the Masoretic Text, and so on.

This volume is available from the U of T Bookroom for $44.25, and UTCS should have a copy available for people to read by the time this issue of *ComputerNews* is published. If you would like to see the book, please telephone John Bradley at 978-3995.

space. As an added bonus, Gopher can still search the compressed files, and it does so in about half the original time.

We used Gopher to export text into PC-Write, a shareware word-processing program. No problems were encountered when exporting either compressed or non-compressed material. Like TWP's RAM-resident "typist", Gopher can work as a RAM-resident program to be called while you are working in your word-processing program. You can send Gopher to search for text anywhere on your hard disk, and when you find what you need, you can insert it directly into the text you are working on.

The search and indexing functions included with Gopher are more sophisticated than those included with TWP and work almost as fast. We searched the compressed ASCII Bible with Gopher for every occurrence of the word "Abraham" and came up with a record of 250 finds in 170 seconds. TWP recorded every occurrence of "Abraham" in 91 seconds. In this test, TWP was faster, but Gopher offsets this by the fact that it can search for patterns that are impossible in TWP.

Which Program is Better?

Gopher worked very well in our trial and proved to be quite a useful product. Once again we prefer a program that allows us the flexibility to work with texts of our choice. However, TWP is a well-designed package and performs its specified tasks admirably and quickly. It can do several things that Gopher and perhaps even TACT and Word Cruncher cannot do and may be adequate for people who simply need a useful scripture reference program.

Checking Your Writing Electronically

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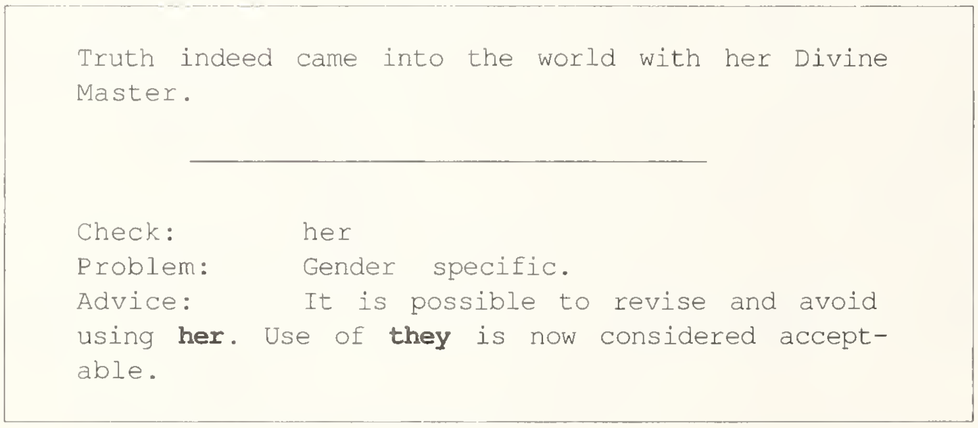
Proofreading is a necessary but tedious and error-prone task for writers, and thus programs that check spelling are welcomed and used by many. They can save people some eyestrain because they assist in the editing stage by catching some errors. Seeing the success of these programs, it seems logical that people would also want to use programs for checking grammar, style, usage, and readability of documents. After all, if a program can be designed to check spelling, then perhaps programs can be designed to catch other common mistakes.

Software companies have created programs that attempt to analyze your writing. We say that they *attempt* to analyze writing, because in practice it has proven to be somewhat difficult to create a program that can detect grammatical errors in written language. In this article we look at one such program that has received good reviews in computer publications, *Grammatik III* (GMK3).

A basic task of GMK3 is to gauge words and phrases against a phrase dictionary, just as a spelling program measures words against a word dictionary. The difference is that when GMK3 catches a problem word or phrase, it tells you what the grammatical or usage problem is and offers "advice" on how to fix it. The User's Guide claims that GMK3 uses "Artificial Intelligence techniques" to decide the part of speech of each word of a sentence and then to tell if each word is grammatically and stylistically correct.

A useful feature of GMK3 is the ability to work directly on documents created in a large number of word-processors. Thus, if your document was made in WordPerfect, you simply tell GMK3 to work in the WordPerfect format. When you start GMK3, you call the WordPerfect file to be analyzed and it not only reads the file, it also allows you to edit your mistakes immediately. Some word-processing formats, however, only allow you to edit by replacing one character for another character. If you want to make more extensive changes, you have to mark the spot, exit from GMK3, and then open the document in the original word processor.

We ran some writing samples through GMK3 to see what sort of errors would be identified. While GMK3 can analyze any piece of writing, in some ways it is designed more for business writing than for academic work. As we shall see, GMK3 is of limited use when analyzing writing that tends to be more polished than the average business letter.



```
Truth indeed came into the world with her Divine
Master.

          ______________________________

Check:        her
Problem:      Gender  specific.
Advice:       It is possible to revise and avoid
using her. Use of they is now considered accept-
able.
```

Figure 1.

Whenever GMK3 encountered a problem in our sample, the screen would divide into two sections, displaying the text in the upper section and identifying the problem and giving advice on how to fix it in the bottom section.

For example, when GMK3 scanned a long paragraph by John Milton, a great English writer of the 17th century, a problem with gender specific language was displayed (See *Figure 1*).

Gender specific language is, at times, inappropriate to use. But in this case, because the subject is female, it is *not* possible to revise and use "they" in place of "her". GMK3 is simply giving a standard built-in warning message in response to the pronoun "her". In a case like this, you must be familiar enough with grammar to know when GMK3 is wrong.

Does this mean GMK3 may cause you to make errors? Probably not, if you are prepared to treat GMK3's advice with caution. It is obvious though that GMK3 is not designed for people who are very inexperienced writers. In many cases, GMK3 will flag problems and give you an opportunity to think about why you wrote what you did, but the program's advice will not necessarily be worth using. The program may be most useful in helping you to analyze early drafts, when you have put down your thoughts but have not spent too much effort on grammatical correctness. At that early stage, GMK3 may help you improve your writing.

For example, it is common for writers to overuse passive voice constructions. In the sentence, "The stick was caught by the dog," passive voice is used. This construction puts the emphasis on the stick, which was acted upon, rather than on the dog, which acted. To put this in the active voice, we would write, "The dog caught the stick." Too many passive constructions tend to make writing complex and more difficult to understand, so GMK3 is designed to catch such constructions. A good feature of GMK3 is that many parts of it can be customized. So, for example, if you like using passive constructions and don't want to be told that it is a problem, you can tell GMK3 not to take note of them.

Also difficult to follow are lengthy sentences. Readability studies indicate that a sentence length of between 16 and 20 words is best suited to the average readership. Thus GMK3 warns you when it decides that a sentence exceeds a suitable length (this length can be customized). Milton's paragraph fared badly in this respect — the average sentence length in his piece was 49.5 words. Does this mean Milton's work is badly written? Not necessarily. What it means is that Milton's technique of using long sentences is out of fashion these days. Once again, you must be familiar with grammar and writing style in order to judge the correctness of GMK3's suggestions.

Electronic "Report Card"

When GMK3 finishes scanning the text and showing you the problems and advice, a screen called the "Summary Report" is displayed. This report gives statistics on readability, paragraphs, sentences, and words, and is designed to help you revise your draft to make your piece clearer and easier to understand. One section of the Summary Report, Readability Statistics, lists three popular readability measurements: Flesch Reading Ease, The Flesch-Kincaid Grade Level, and Gunning's Fog Index. These are measurements of your writing against certain predefined readability tests such as number of words per sentence, number of syllables per word, and so on.

Flesch Reading Ease scores writing from zero (very difficult to read) to 100 (very easy to read). Milton scored 35. Interestingly, we took an excerpt from the GMK3 User's Guide and ran it through GMK3. It received a relatively difficult 24.

The Grade Level score gives the number of school years needed to understand the writing. To understand the excerpt from the GMK3 User's Guide, according to GMK3, you need 14 years of schooling (first year university?). According to GMK3, potential Milton readers need 21 years of schooling to understand the excerpt. The Fog Index also gives the grade level needed to understand a piece. Based on different calculations than the Grade Level score, the results tend to be different. To read the GMK3 User's Guide, a grade 18 education is needed according to this gauge, and Milton's piece requires a grade 25 education to be understood.

Another section of the Summary Report, Paragraph Statistics, gives the number of paragraphs in your piece and the average number of sentences per paragraph. Sentence Statistics lists the number of sentences containing passive voice, as well as those ending in a question mark or exclamation mark. Word Statistics gives the number of words and prepositions and the average number of characters and syllables per word. Some of these statistics could help you observe your progress as you adjust your writing style. For example, you can keep track of the number of exclamation marks you use if you tend to overuse them. Or you can easily see if your sentences are, on average, too long or too short.

GMK3 has a useful Help system that can be accessed from anywhere in the program. If you don't understand why you need verb/subject agreement in a sentence, you can view the six Help screens on this point. The manual is also quite helpful in explaining why certain mistakes are problems and presents common ways to deal with them. Of course, if you simply need information, you can probably get more thorough explanations from a style and grammar book.

A final positive aspect of GMK3 is that its creator seems to be committed to upgrading and improving the product. GMK3 contains a number of improvements on the previous version, and a free up-grade package is supposed to be available to owners of GMK3 as of November 1988. This upgrade contains a number of enhancements for GMK3, including a pop-up RAM-resident version.

Should You Buy GMK3?

GMK3 can catch errors that might otherwise go unnoticed, and help writers to look at writing with a more critical and informed editorial eye. For practical purposes, it is probably of limited use to most academics. We do feel that GMK3 is a move in the right direction. Perhaps, in a few years, this type of program will appear as a standard feature in word-processing programs. If you are interested in the program, we have a copy that you can use to analyze your writing. For more information on GMK3, please call the Text/Imaging Support Group at 978-3995.

GMK3 is made by Reference Software (330 Townsend Street, Suite 123—San Francisco, CA 94107). Business World of Toronto (telephone (416) 367-8088) sells it for $89.

Accounting News: UTCS Debit Memo Policy

Marg Doherty
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Beginning in January 1989, UTCS will not be issuing Debit Memos for charges under $200. Customers will continue to receive a copy of the UTCS Billing Authorization Form, which should be retained as a permanent record of the transaction. Charges under $200 approved on the Billing Authorization Form will be billed directly to the customer's Appropriation Account. UTCS will continue to issue Debit Memos for charges over $200. This change in policy affects only those customers paying for services directly by Appropriation Account. Customers charging services to a Customer Account Number (CAN) are not affected.

For further information, please telephone Marg Doherty at 978-8697.

The Electronic Embryo

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UTCS recently assisted the Department of Medicine and the Apple Research Partnership Program (ARPP) in evaluating the possibility of using computers to create three-dimensional video images of an embryo for computer-aided instruction (CAI). This discussion is a brief description of one small part of a large, ongoing CAI project.

The original embryo model was first digitized in three dimensions by ARPP and the Department of Medicine. A special three-dimensional digitizer returned x, y, and z coordinates of any point on the model by touching a pointer to the model and pressing a button. This information was collected on an Apple Macintosh computer. The surface of the model was described as approximately 1000 triangular areas. This digitization was done by the Apple Research Partnership Project staff.

The model data was then subjected to a process called "rendering" using a SUN computer and software at the Dynamic Graphics Project Group. In rendering, a computer program figures out how a light source would reflect from each of the 1000 triangles comprising the digitized embryo. Then the light source and the viewing eye were rotated two degrees and the rendering process repeated. This was done 180 times to give a complete view of the embryo from all sides. Each rendering produced a disk file, each containing a different view of the embryo. The 180 rendered views took approximately 270 CPU minutes of SUN 3/280 time. ARPP staff are looking into doing the rendering on Macintoshes also.

When the rendering was complete, each of the 180 image files was loaded, one at a time, into a device called a frame buffer and each frame was recorded onto a video tape. Many hours of loading files and "writing" to video tape produced six seconds of video tape! Once again the Dynamic Graphics Project Group provided the expertise and equipment to make this six seconds of video tape.

The six second video tape of a rotating embryo was processed at Instructional Media Services to duplicate individual frames, move frames, create a still view, and make a reverse rotation sequence. With these additions, the six second video became a 12 second movie!

The final step in the process will be to record the 12 seconds of video onto a 12-inch laser videodisc. Normally, a videodisc is capable of holding hundreds of megabytes of computer data or thousands of frames of video information. In the CAI environment, a combination of both computer data and video frames would be stored on the same videodisc. The embryo video will be transferred to a laser videodisc only to ensure that all the steps of the process have been tested and been found to work before a major commitment is made to produce hours of video information.

There are many potential uses of the electronic embryo on videodisc. The laser videodisc player can be controlled by computer in the learning lab and the person writing the lesson has great flexibility in the use of the video. Computer graphics can be placed on top of the image, the video can be started and stopped as desired and individual frames of the video can be viewed as still images while information about the image is presented.

Creating the electronic embryo is one small step toward greater flexibility in teaching and learning. For more information about this project contact Terry Jones at 978-4924.

Macintosh Users — Take Note(s)!

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Mark Vanderkam
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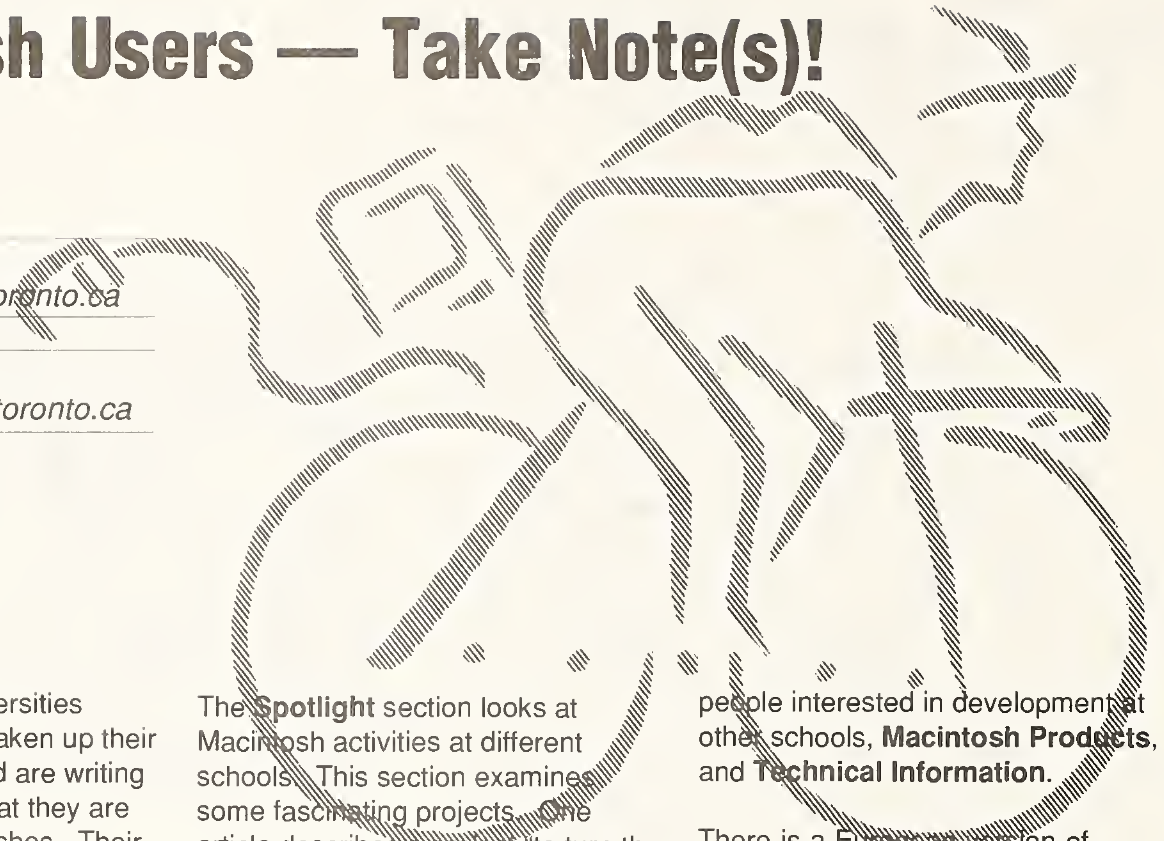

Macintosh users in universities around the world have taken up their pens and keyboards and are writing a flurry of articles on what they are doing with their Macintoshes. Their articles are informative, diverse, and, at times, quite original as people with varied levels of experience and creativity share their projects and news with their peers. The articles appear in a quarterly Apple publication called *Wheels For The Mind*, a 100-200 page book that is probably the best source of information on Macintosh-use in the academic community. *Wheels* acts as a forum and central clearing-house for information on Macintosh-related computer projects and activities in university communities.

To describe the publication, it is perhaps best to describe the different sections. For example, each issue has a **Focus** section which concentrates on a particular theme. In the Winter of 1987, Focus looked at "using the Macintosh in computer science." In another issue, *Wheels* focused on using the Macintosh for engineering.

The **Spotlight** section looks at Macintosh activities at different schools. This section examines some fascinating projects. One article describes a project "to turn the Cray supercomputer into a coprocessor for the Macintosh, providing the power of the Cray and the ease-of-use of the Mac." Another article, entitled "New Vistas in Computer Literacy", describes a "revolutionary approach to teaching computer literacy" at the University of Waterloo. The developers cover the structure of a new course in detail, reporting that the course was taught to "1500 students in the first year alone, . . . with more clamoring to get in."

News and Notes contains requests for information and notes about new products of interest. Other sections include **Tips and Techniques**, with hints for popular programs, **Resources**, containing a bibliography of helpful books and other resources, **Project Reports**, which describes software under development and how to get in touch with people interested in development at other schools, **Macintosh Products**, and **Technical Information.**

There is a European version of *Wheels* that covers projects and activities in Europe and a Canadian publication called *Mind in Motion*. This latter book is a collaboration between Apple Canada and York University and is dedicated to both the academic community and to educators in the business community. The latest copy of *Mind in Motion* can be ordered from Mary Lou Smith at Apple Canada. Her phone number is (416) 477-5519, and the cost of the book is $4.

To get more information about *Wheels For The Mind* or to subscribe, write:

Apple Computer, Inc.
Wheels For The Mind 23L
P.O. Box 810
Cupertino, CA 95015

Single-year subscription price is US$24.

Numerical and Scientific Software for Microcomputers

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MathCAD News

In the July/August 1988 issue of *ComputerNews* (#248), we described MathCAD 2.0, a software package that creates a sophisticated "electronic scratchpad" on your PC. Although our review recognized the power and user-friendliness of the product, we were hesitant to recommend using the package for complicated computations. Since then, MathSoft Inc., the makers of MathCAD, has released three "Applications Packs" that considerably enhance the usefulness of the package. These packs are sets of MathCAD programs which perform specific tasks. The **Advanced Math Applications Pack** contains programs for solving differential equations, calculating eigenvectors and more. There are also two statistics packs. **Statistics I** contains programs for test and estimation (chi-square test, one-way analysis of variance, t-test, jackknife estimates, bootstrap estimates for standard error, and so on), and **Statistics II** contains programs for modeling and simulation (frequency distribution of data, multiple regression, forecasting by exponential smoothing, random deviates, combinatorial formulas, and others).

IMSL Library for PC

IMSL is a FORTRAN Library of numerical subroutines that is widely used by mainframe computer users. This library is now available for IBM PC and compatible microcomputers. UTCS recently acquired two modules of the library, **MATH** and **SFUN** (special functions), for use with the Microsoft 4.0 FORTRAN Compiler. Hence, we can extend our support of the IMSL Library to the microcomputer version, and users interested in using this library can try it at UTCS. We also have Quick Reference Guides for SFUN and MATH modules at $1.50 each.

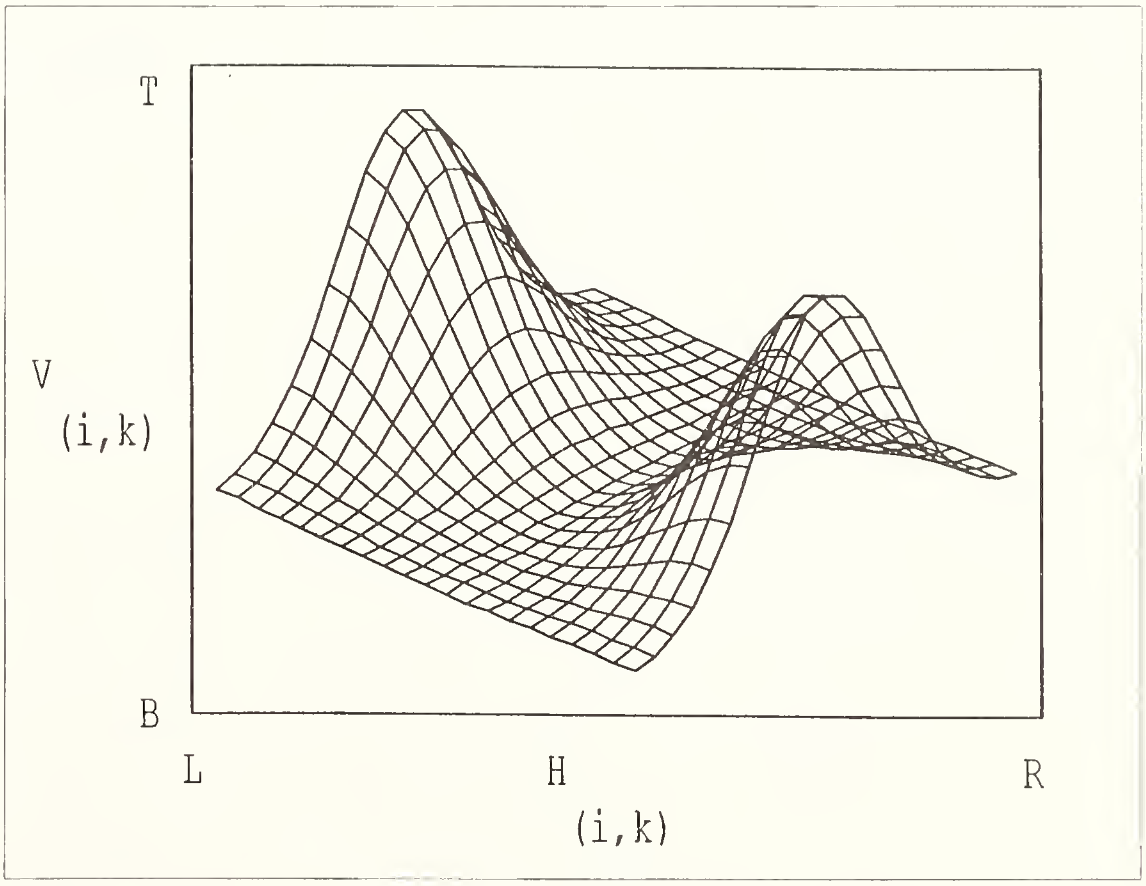

Figure 1: "fishnet plot" of a surface using a program from Advanced Math Applications Pack.

Dynamical Software or Chaos on Your Computer

Dynamical Software (DS) is a collection of programs that aims to provide a student or research scientist with a set of tools (which are more or less complete) for studying dynamical systems — either mathematical models or experimentally-generated time series. It can be used in any field where problems of chaos or nonlinear dynamics arise — physics, chemistry, biology, economics, social sciences, and so on. The software package consists of two diskettes. **DS I** allows users to solve differential equations, iterate discrete maps, plot and color-code trajectories in two and three dimensions, slice three dimensional orbits, and so on. Additionally, attractors can be reconstructed from univariate data sets, which can also be smoothed and interpolated. **DS II** adds additional integrators and programs for computing power spectra, eigenvalues and eigenvectors, Lyapunov exponents and fractal dimensions. One can also construct bifurcation diagrams.

Readers interested in nonlinear dynamics might like to consult an article, printed in the March/April 1988 issue of *Academic Computing*, called "Chaos in The Classroom: Nonlinear Dynamics and Dynamical Software," by W.M. Schaffer and G.L. Truty. In this article, the software and its background is discussed in more detail. The journal is not readily available at the U of T campus, but we have the March/April issue at UTCS. (For those interested, a popular treatment of chaos can be found in a book by J. Gleick called *Chaos*, Viking Penguin Inc., New York, 1987.)

At UTCS we have a Dynamical Software demonstration diskette for interested users to examine. Some of the images of chaotic attractors produced by the demo program are very impressive. An example is the picture of the Rossler attractor in *Figure 2*. Dynamical Software graphs make extensive use of colours for better presentations of certain aspects of chaos. Demonstrations on a colour screen can be arranged for interested users.

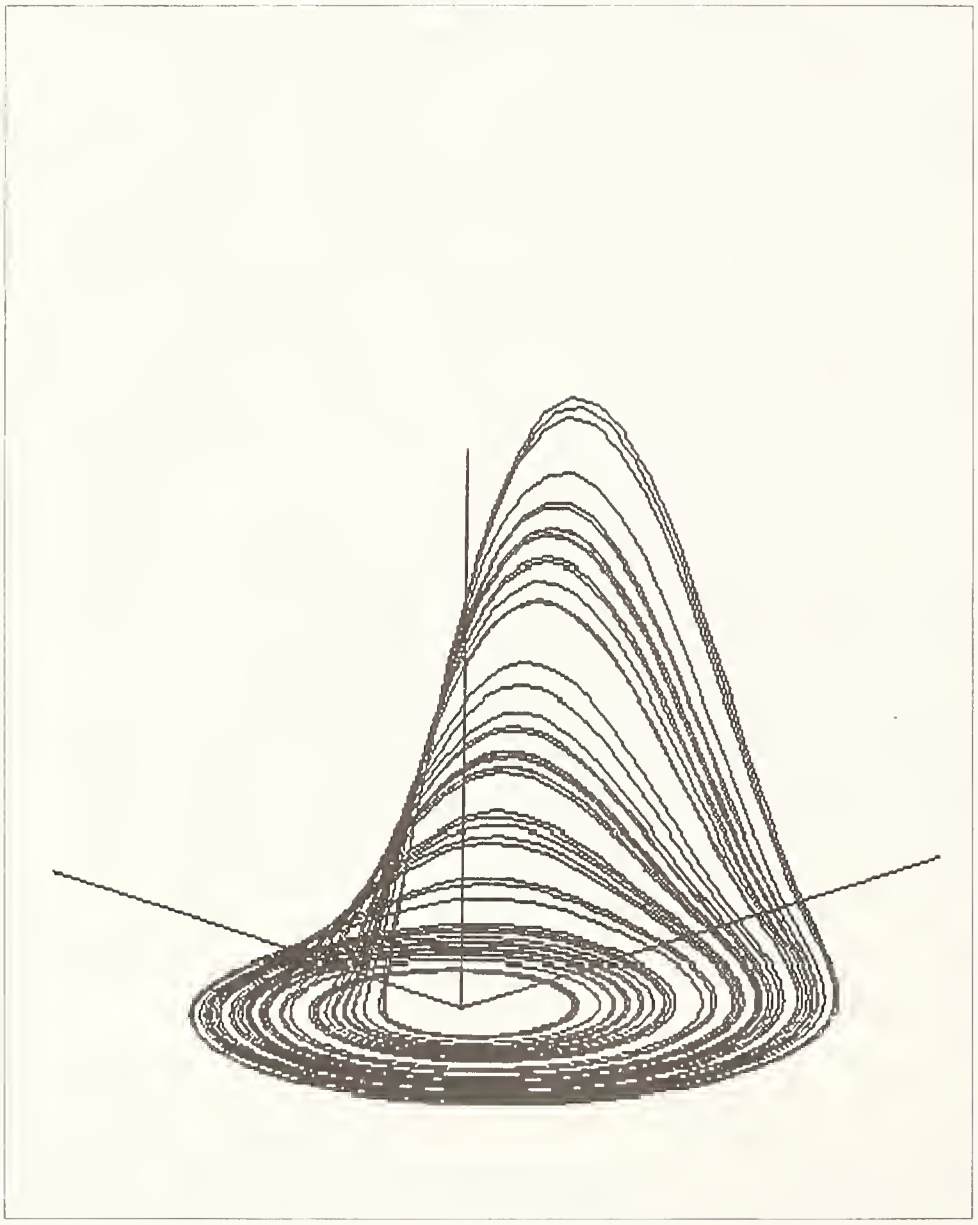

Figure 2: Rossler attractor

Dynamical Software information

Dynamical Software is a product of Dynamical Software Inc., P.O. Box 35241, Tucson, Arizona 85740, USA

System requirements:

IBM PC compatible microcomputer (XT, AT, and 80386-based machines, or Tandy 2000) with 640 Kb of RAM, graphics card (CGA, EGA, Hercules, Vega Video Deluxe, Tandy 640x400) and FORTRAN Compiler (Microsoft or Ryan MacFarland). A hard disk, numeric coprocessor, and Microsoft compatible mouse are recommended but not required.

Pricing:

The **DS I** diskette costs US$350.

GAUSS News

GAUSS Version 2.0 has finally arrived, giving us an opportunity to review it and gather some initial impressions. The first thing we noticed about the package is the new manual — it is now professionally typeset and has a more convenient format. It is also better organized and generally easier to use.

GAUSS 2.0 has a context sensitive on-line help available — typing **Alt-H** gives key settings corresponding to the current mode (Command or Edit). You may also request help on library procedures, where you are able to examine the source code for the procedure in question.

GAUSS 2.0 comes with a new, powerful, fullscreen editor that will satisfy most users. Besides a number of fancy editing features, the editor also allows more flexibility in transferring text between the Command mode screen and Edit mode.

GAUSS 2.0 is said to be very closely compatible with earlier versions, and most programs should execute without changes. The programs that we tried presented no problems except where using graphics (see below).

There are some new commands and some changes to old ones. For example, handling of complex matrices has been improved. A great many changes have been made to external functions. Some have been rewritten, renamed, or dropped, and some new ones have been added. You can still keep old functions if your programs depend on them.

Several of the programs that were a part of Version 1.49B are not included with the GAUSS 2.0 package. These programs are still being revised and will be made available at a later date. The old programs can be recompiled with Version 2.0, and it is reported that most will run without changes.

Graphics routines have been completely changed, including the names of the routines, the way they are used, names of the global variables, and so on. The changes are mostly for the better, both in terms of ease-of-use and of the quality of the output produced. However, such a drastic change could be frustrating for users who are accustomed to the old routines. Additionally, there seem to be omissions in the part of the manual dealing with publication-quality graphics. We had problems running Quick Graphics procedures. When contacted, Aptech Systems promised to look into it. They also confirmed that there is a bug in a device driver for the Hewlett-Packard HP GL plotter (attempts to use it resulted in frustration only) and promised to send a fix.

Generally speaking, Version 2.0 is a definite improvement of an already powerful product, but this improvement comes at a price. GAUSS 2.0 uses an additional 70 kilobytes (KB) of RAM, making less RAM available for the workspace. Contrary to our hopes, there is no way to use expanded or extended memory, although there is a provision for placing temporary files onto a RAM disk. This, however, does nothing for the workspace, nor for the limit on matrix size (8190 elements). Aptech Systems is promising to release a special version of GAUSS for 80386-based machines that will break the 640KB barrier, but no hope is in sight for owners of 80286-based machines.

Public Domain Software

Public domain software includes a large body of noncopyrighted software (or software with limited copyrights) that can be freely, or almost freely, shared between all users (some people get confused into thinking that *all* software can be freely shared, but this is *not* the case). UTCS has a CD-ROM disk containing programs from diskettes #1 to #817 of the PC-SIG Library. (PC-SIG is a library of public domain programs for IBM PC compatible micros — at present it includes over 1000 360KB diskettes.) Users are welcome to come in and browse through this disk and copy any programs that interest them. There are also several companies which specialize in distributing free software. Probably the largest Canadian company is Canada Remote Systems, which distributes a full complement of PC-SIG diskettes. Another one, whose catalogue we have scanned for useful programs, is Alternative Personal Software (APS). These companies usually charge around $6-$7 for a 360KB diskette.

A major drawback of public domain software is that you must use it at your own risk. Commercial software is generally more rigourously tested than public domain software – even then, there is no guarantee that your numerical (or statistical) programs are accurate or even correct. Nevertheless, you may find some programs interesting. Brief descriptions of three of them follow.

Algebraic Computations

(APS #496)
Algebraic Computations is a batch-oriented program (this means that input is created in one file, and after the program is executed, the results are found in another file) for large but simple algebraic computations. The program has a special language consisting of commands that describe the elementary tasks into which an algebraic manipulation problem can be divided — but everything else is up to the user. To solve an algebraic manipulation problem, you build up an algorithm using these elementary commands. The package includes some examples to show how the program works, and for one of them, the inverting of a power series expansion, there is an equivalent muMATH program and a claim that Algebraic Computations solves this problem over 100 times faster (we have checked it — it does!). (For a review of muMATH, see the November/ December 1988 issue of *ComputerNews*, #251.)

MatLab Version 1.0

(APS #864 and #865)
MatLab is an interactive program providing easy access to matrix software developed by the LINPACK and EISPACK projects. These two diskettes provide a very limited version of the commercially available PC-MATLAB (which was reviewed in the July/August 1988 issue of *ComputerNews*, #248). The main drawback of this public domain program is that there does not seem to be a way of reading an ASCII file into the MatLab workspace. This means that the first time you want to work with a matrix, you have to enter it into MatLab at the keyboard. Once it is entered, however, you can save it as a MatLab file and use it repeatedly.

CHEMICAL and CHEMVIEW

(PC-SIG #938)
CHEMICAL is a molecular modeling program for forming three-dimensional (3-D) pictures of chemicals. You can select atoms from the Periodic Table, and the program retrieves the electron orbital information. The atoms can be bonded into molecules, and the molecules bonded with other molecules to form large chemicals. The chemical is displayed as it is constructed, and when it is formed it can be rotated and viewed from different angles. **CHEMVIEW** is a companion program that shows 3-D animation of the models made with CHEMICAL. These programs may be of educational value for introductory chemistry courses.

Symbolic Manipulation Software

UTCS recently received a copy of **Derive**, a symbolic manipulation program for IBM PCs and compatibles. This program is a successor to muMATH, and we shall review it for the March issue. We also expect to have a review copy of **Mathematica** by the time this article is published.

For More Information

If you need more information on the Applications Packs, the Dynamical Software demonstration diskette or colour screen demo, or any of the above programs, please contact Andrzej Pindor at 978-5045.

New SAS RLINK Files

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Some changes were made at the end of November 1988 to the PACX protocol and, as a result, RLINK files require certain modifications. People who received SAS/PC (Version 6.03) before November 1988 and want to start using the micro-to-host link should contact us to either receive new RLINK files or to get instructions on how to modify the ones they have. For more information, please telephone Andrzej Pindor at 978-5045.

ARCHIVIST Now Available At UTCS

Paul Roth
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ARCHIVIST, reviewed in the November/December issue of *ComputerNews* (#251), is a textual database management system for IBM PCs and compatibles that lets you organize lecture notes, research notes, product information, bibliographies, or any other text-based information that can be arranged in discrete units. Our review found it to be an easy-to-use, well-designed product that provides genuine function at a good price. Seeing that ARCHIVIST could be of benefit to a number of users at U of T, UTCS has entered into a limited multiuser license with *IRL Press Inc.* in order to make ARCHIVIST available at a reduced price.

Under the terms of the license, UTCS can duplicate the ARCHIVIST diskettes and distribute them to a limited number of users. The cost to a user will be $40; for this we will copy the software onto any size of diskette (either two 360 kilobyte (KB) diskettes, or one 1.2 megabyte (MB), 1.44MB, or 720KB diskette), which the user provides. Documentation is included on diskette as a text file, which may be printed or searched online as an ARCHIVIST file. There is also a printed, bound version of the manual that users can purchase for an additional $40 fee (we will only order the manual if there is demand for it). In addition, each licensee must sign a license agreement.

As discussed in last month's *ComputerNews* article, we can, to a limited extent, help interested users make use of ARCHIVIST. If you would like to obtain a copy, please call Paul Roth at 978-5426.

Microcomputer Courses

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The following list shows courses scheduled from February through to April only; more courses are scheduled for May and June. Anyone interested in attending one of these sessions, or requiring information on courses scheduled after April, should call 978-4565.

Microcomputer Concepts (PC)
April 5, 1989
9:00-12:00 noon

Desktop Publishing Seminar
February 16, 1989
10:00-3:00 p.m.

Introduction to dBASE III Plus
April 10-14, 1989
2:00-5:00 p.m.

Introduction to DOS
February 27 - March 3, 1989
9:00-11:00 a.m.

Introduction to Excel on the Macintosh
March 6-10, 1989
9:00-12:00 noon

HyperCard Seminar
February 13-17, 1989
2:00-4:00 p.m.

February 24, 1989
10:00-3:00 p.m.

Introduction to Lotus 1-2-3
February 13-17, 1989
2:00-5:00 p.m.

March 6-10, 1989
12:30-3:00 p.m.

Introduction to PageMaker
February 20-24, 1989
9:00-11:00 a.m.

April 24-28, 1989
1:00-3:00 p.m.

ProComm Communications Seminar
April 5, 1989
1:00-3:00 p.m.

Introduction to SAS on the PC
March 6-10, 1989
3:00-5:00 p.m.

April 24-28, 1989
3:00-5:00 p.m.

Intermediate Applications of SAS on the PC
February 20-24, 1989
2:00-5:00 p.m.

Introduction to Microsoft Word (PC)
April 24-28, 1989
9:00-12:00 noon

Introduction to Microsoft Word (Macintosh)
March 27-31, 1989
9:00-1:00 (Mar.27)
9:00-12:00 (Mar.28-31)

Introduction to WordPerfect Version 5.0
February 13-17, 1989
9:00-12:00 noon

March 6-10, 1989
9:00-12:00 noon

March 13-17, 1989
12:00-3:00 p.m.

April 10-14, 1989
9:00-12:00 noon

Introduction to WordPerfect Version 4.2
March 13-17, 1989
9:00-12:00 noon

April 24-28, 1989
12:00-3:00 p.m.

Advanced WordPerfect 4.2
April 10-14, 1989
12:00-2:00 p.m.

Documents at UTCS

All vendor-produced documentation may be ordered through the UTCS Information Office, Room 201, 4 Bancroft Avenue. UTCS documents and selected vendor documents are also stocked there for purchase. For more information on prices, call Dale Wright at 978-4990. Whenever feasible, documents are made available online, and users are encouraged to print their own copies. On the VM machine, a special command has been provided for this purpose.

To print online documents on:

IBM VM/CMS	***GP UNIX***
Type "help document"	Use *lpr* command

The following examples relate to the table below. The document to be printed is the UTCS Guide to Census Tapes, called CENSUS LISTING on CMS and /usr/doc/utcs/census on GP UNIX. <RETURN> means RETURN or ENTER key.

CMS:

```
document <RETURN> <RETURN>
laser census listing (forms yxle <RETURN>
```

GP UNIX:

```
nohup lpr -8p -fyxle /usr/doc/utcs/census & <RETURN>
```

UTCS Documents in hardcopy

New:

Previously announced:

Academic's Guide to Microcomputer Systems
Character Sets for Highspeed Printing
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics
UTCS GUIDE TO PRODUCTS AND SERVICES: Accounting
UTCS Catalogue: Numerical Products
UTCS Catalogue: Statistics Products
UTCS Catalogue: Text Products
UTCS Guide to Census Tapes
UTCS Guide to Kermit
UTCS Guide to Micro File Transfer Service
UTCS Guide to Text Processing on GP UNIX

UTCS Documents online

	CMS LISTING	GP UNIX	Forms Code
New:			
Previously announced:			
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction	INTRO	/usr/doc/utcs/intro	*
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics	BASICS	/usr/doc/utcs/basics	*
UTCS Catalogue: Access, Part 1	ACCESS1	/usr/doc/utcs/access1	*
UTCS Catalogue: Access, Part 2		/usr/doc/utcs/access2	*
UTCS Catalogue: Numerical Products	NUMCAT		*
Product-Function List	NUMLIST		BXQD
UTCS Catalogue: Statistics Products	STATCAT		*
Product-Function List	STATLIST		BXQD
UTCS Catalogue: Text Products	TEXTCAT	/usr/doc/utcs/textcat	*
UTCS Guide to BMDP	BMDP		*
UTCS Guide to Census Tapes	CENSUS	/usr/doc/utcs/census	*
Recipes for Using Tapes on VM/CMS	QUIKTAPE		*
UTCS Guide to FORTRAN on VM/CMS	FORTRAN		*
UTCS Guide to GP UNIX		/usr/doc/utcs/gpunix	*
UTCS Guide to Highspeed Printing	PRINT	/usr/doc/utcs/print	*

* *Recommended forms code for the 8700 is YXLE unless otherwise stated.*
† *Use the 87set command. Type "help 87set".*

Documents continued

UTCS Documents online continued

	CMS LISTING	GP UNIX	Forms Code
UTCS Guide to Kermit	KERMIT	/usr/doc/utcs/kermit	*
UTCS Guide to Micro Laser Printing Service	MICRLASR		*
UTCS Guide to SAS	SAS		*
UTCS Guide to SCRIBE	SCRIBE		*
(For printing instructions, see page 1 of document)			
UTCS Guide to Series/1 Terminal Use	SERIES		*
3270 Emulation:			
Cybernex APL100 and Volker Craig VC404	CYBER		*
DM1520	DM1520		*
Hardcopy Terminal	HARDCOPY		*
IBM 3101	IBM3101		*
IBM PC Kermit	PCKERMIT		*
SOROC IQ	SOROC		*
VT52	VT52		*
VT100	VT100		*
UTCS Guide to SPSS	SPSS		*
UTCS Guide to Text Processing on GP UNIX		/usr/doc/utcs/text	YXOG
UTCS Guide to TFW.MAK in SCRIBE	TFWMAK		*
UTCS Guide to VM/CMS	CMSGD		*
UTCS Guide to WSCRIPT	WSCRIPT		*
UTCS Rate Schedule (Commercial)	RATESCOM		†
UTCS Rate Schedule (External)	RATESEXT		†
UTCS Rate Schedule (Internal)	RATESINT		†

Other Documentation online

Electronic Mail			
A User's Guide to Electronic MAIL	MAILBOOK		YXOC
Kermit			
Kermit Protocol Manual	KERMITPM		YXOE
Kermit User Guide	KERMITUG		YXOF
ProComm			
ProComm Reference Manual	PROCOMM		YXOE
VMBATCH Documents			
VMBATCH User's Guide	VMBATCH		YXOA
VMBATCH Messages and Codes	VMBATMC		YXOA
VMSECURE			
VMSECURE User's Guide	VMSECURE		YXOE
VM Tape Documents			
TapeMap User's Guide and Reference	TAPEMAP		*
VMTAPE Messages and Codes	VMTMSGS		YXOE
VMTAPE User's Guide	VMTUSER		YXOE
Waterloo SCRIPT			
Reference Manual	WSCRPTRF		YXLC
User's Guide	WSCRPTUG		YXLC
Using SCRIPT in MVS/TSO	WSCRPTSO		YXLC
Waterloo SCRIPT and a PostScript Printer	WSCRPTPS		YXLC
Formula Processor Summary	WSCRPTFP		YXLC
GML User's Guide	GMLUG		YXLC
GML Reference Summary	GMLRFSUM		YXLC

** Recommended forms code for the 8700 is YXLE unless otherwise stated.*

† Use the 87set command. Type "help 87set".

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	BC214	978-7109
External Marketing Consultant	Ihor Prociuk	BC217	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Information Office	Dale Wright	BC201	978-4990
Account & Access Code Enquiries (U of T)	tba	BC101B	978-8703
Account & Access Code Enquiries (External)	Sylvia May	BC101B	978-7148
IBM PC Maintenance	Kam Mark	BC103	978-5050
Tape Library (Academic Services)	Susan Kovago	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Terminal Service	Rosi Tseu	BC105	978-7087
UTCS Noncredit Short Courses	Irene Rosiecki	BC217	978-4565

Consulting & Advising Services:	978-HELP
CMS, and GP UNIX userids:	ADVISOR
CMS Userid for mail problems:	POSTMSTR
System Status Enquiries (GP UNIX)	978-4318
System Status Enquiries (IBM)	978-7393
Interactive Services 300 (bps)	978-6200
Interactive Services 1200 (bps)	978-3959
Interactive Services 2400 (bps)	978-7239
Datapac	4320 0056
Telnet	0302043200056
Tymnet	<backspace>DPAC;302043200056

UTCS Directory

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Operations Support	Dr. Bob Chambers	MP350	978-7092	
Systems Support	Bill Lauriston	MP331	978-3579	bill@vm.utcs.utoronto.ca

Committees on Computing

Committee on Administrative Computing	Chair	Janice Oliver	978-4322
UTCS Board	Chair	Prof J.F. Keffer	978-4984
Supercomputer Users' Group at U of T	Chair	Prof. J.M. Ting	978-4971
Research Board Standing Committee on Computing	Chair	Prof. C.C. Gotlieb	978-2986

Legend

BC = Bancroft Building
ER = Erindale
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

UTCS Terminal and Advising Sites

Names and Locations

Central Advising Office (CAO), 978-HELP
Engineering Annex (EA, CDF), 11 King's College Road, Rooms 103, 107, 107B, 201, 203
Erindale College (Erin), 828-5339, Mississauga Road, Erindale Campus, Rooms 2037, 2039A-B-C, 2045
Robarts, Robarts Library, 130 St. George St., Room 1061A
Sidney Smith (Sidney), 100 St. George St., Rooms 1071, 2105
St.Michael's College, 121 St. Joseph St., Room 107
Trinity College, 6 Hoskins Ave., Room 024
Victoria University, 73 Queens Park Cres., Room 208

Access Hours

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	Fri	Sat	Sun		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Erin (2039)Δ	9:00-17:00	9:00-17:00	12:00-16:00	12:00-16:00	Research	Rm 2005
(2045-46-47)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
(235)†	8:00-22:00	8:00-17:00	closed	closed	None	Rm 2046
Robarts	8:30-24:00	8:30-24:00	9:00-22:00	13:00-22:00	None	978-HELP for Research
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Trinity	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	None	978-HELP for Research
Victoria	8:30-24:00	8:30-21:00	8:00-13:00	8:00-13:00	None	978-HELP for Research

Sites	Advising Hours
CAO	Monday through Friday, 10:00 - 18:00
Erin	Monday through Friday, 09:00 - 22:00

Legend

* Research includes graduates, faculty, staff.
Δ Key access available.
† Access restricted to building hours.

Terminal and Printer Access

Sites	PACX	Network Terminal Server	Printers	CDF/PC Terminals
CDF	N	N	Y	N
EA	N	Y	Y	N
Erin	Y	Y	Y	N
Robarts	Y	N	Y	Y
Sidney	N	Y	Y	Y
St.Michael's	Y	N	Y	Y
Trinity	Y	N	Y	Y
Victoria	Y	N	Y*	Y

(Y=yes, N=no)

* CDF/PC only

UTCS Services

UTCS Centrally Owned and Managed

Systems

IBM VM/CMS

- General Purpose Timesharing; access to NetNorth, BITNET, and EARN networks; access to CRAY X-MP/22
- 4381 P02 processor, 16 megabytes of memory
- CP operating system, VM/SP HPO R4.2
- CMS timesharing system, VM/SP Release 4
- RSCS spooling system, Release 3
- CRAY station Release 4

GP UNIX
Technical Assistance: 978-8853

- General Purpose Timesharing under SUN UNIX 3.2
- SUN 3/280, 8 megabytes of memory
- access to Linotronic typesetter
- offers a sophisticated and powerful environment for text processing
- offers a sophisticated programming environment suitable for commercial software development or testing
- full access to USENET, an electronic technical information exchange facility
- offers excellent electronic mail facilities and ability to send or receive mail from most computer networks worldwide, such as UUCPNET, ARPANET, NetNorth, BITNET, CSNET, CDNNET

Services

Communications & Technical Support
Primary Phones: 978-3787, 978-4967

- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs, Micro Vaxes, and Macintoshes, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides consulting on local area networking and installs LANS
- provides access to NetNorth (BITNET), the North American Universities Network; ONET, the Ontario Regional Network; and USENET, the UNIX networking fraternity
- provides gateway to the US Internet
- will provide a communications solution to department needs on a contractual basis

Information Centre
Primary Phone: 978-HELP

- Provides assistance in use of electronic messaging, including use of Local Area Networks (LANS); NetNorth/BITNET/EARN, the world Universities network; CDNNET, the Canadian X.400 network; ARPANET; CSNET; USENET; and other international connections.
- provides advising, consulting and documentation on:
  - command languages, including CMS and UNIX
  - high level languages, including FORTRAN, and PL/I
  - packages and libraries, including SAS, SPSS-X, BMDP, IMSL, and NAg
  - editors and formatters, including XEDIT, ed, nroff/troff
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - operates UTCS Microcomputer Bulletin Board System
  - offers Micro Laser Printing Service
  - offers 35mm slide production service using Polaroid Palette
  - administers Local Area Network of PCs for Education Facility
  - administers Macintosh Education Facility
- high quality typesetting
- installs and maintains application packages
- provides short courses and seminars on the more popular services and software packages

> *The principal mandate of UTCS is to plan, implement, and operate facilities and "common-carrier" networks, and to plan and support divisional, departmental or project computer facilities as requested.*

Facilities Managed by UTCS

Administrative Computing

- administrative IMS/VS, DB/DC, DB2, Batch, and TS0
- 4381-R14 processor, 32 megabytes of memory
- MVS operating system

Computer Disciplines Facility/UNIX

SUN 3/280s, 8 megabytes of memory (zero.cdf)
- Computer Science interactive access
- SUN UNIX 3.5

SUN 3/280s, 16 megabytes of memory (one.cdf)
- Computer Science interactive access
- SUN UNIX 3.5

Computer Disciplines Facility/PC

- 97 TI Professional Computers connected in a Local Area Network
- introductory Computer Science instruction
- MS-DOS with Turing environment

Erindale College Systems

VAX 8200, 8 megabytes of memory
- instructional access using VMS
- research access

VAX-11/750, 5 megabytes of memory
- instructional access using UNIX (Berkeley UNIX 4.3BSD)

Institutional Relations System

VAX-11/750, 8 megabytes of memory
- database services to the owner departments using VMS

EPAS Facility

- 4361-5 processor, 16 megabytes of memory
- general VM/CMS services to the owner departments

Ontario Centre for Large Scale Computation (OCLSC)

- Cray Research Inc. X-MP/24
- 2 processors, 4 megawords main memory
- solid state disk (SSD) with 64 megawords of storage
- COS 1.16 operating system
- VAX 8350 + MicroVAX II and VAX750 provide VMS front-end services
- VM front-end services provided by UTCS 4381-P02

Software List continued

SOFTWARE LIST for MICROCOMPUTERS

The following are microcomputer software packages for which UTCS can provide either support or some information. As with mainframe products, micro packages receive full support (Class A), limited support (Class B), or no active support (Class C). The specific criteria differ from those for mainframe classes and are outlined in the Academic's Guide to Microcomputer Systems.

Package/Compiler	Version	Environment	Support
Application Development Tools			
BASIC			
GW BASIC	—	MS-DOS	B
C			
Microsoft C	5.1	MS-DOS	B
MPW C	2.0.2	Macintosh	B
WATCOM C & Express C	6.0	MS-DOS	B
FORTRAN			
IBM FORTRAN/2	1.0	MS-DOS 3.3 & OS/2	B
Language Systems FORTRAN	1.0	Macintosh	C
Microsoft FORTRAN	4.0	MS-DOS	B
WATCOM WATFOR-77	3.0	MS-DOS	A
Pascal			
MPW Pascal	2.0.2	Macintosh	C
TURBO Pascal	—	MS-DOS	B
Tools			
ResEdit	1.2d0	Macintosh	B
HyperCard	1.2.1	Macintosh	A
Macintosh Programmer's Workshop	2.0.2	Macintosh	B
WATCOM GKS	1.3	MS-DOS	B
Communications			
File Transfer & Terminal Emulators			
Kermit	0.8(35)	Macintosh	A
Kermit	2.30	MS-DOS	A
Kermit	—	Apple II DOS	C
Kermit	—	CP/M	C
Lap-Link DeskLink	1.0	MS-DOS	B
Lap-Link Mac	1.2	Macintosh	B
Lap-Link PC	2.16	MS-DOS	B
MacTerminal	2.2	Macintosh	B
PC TALK3	—	MS-DOS	C
PC PLOT III	—	MS-DOS	C
ProComm	TU 2.4.2	MS-DOS	A
Red Ryder	10.3	Macintosh	B
Network Systems			
AppleShare	2.0.1	Macintosh	B
Novell Advanced Netware	2.0a	MS-DOS	B
TOPS	2.0	Macintosh	B
TOPS	2.0	MS-DOS	B
Network System Utilities			
Inter•Poll	1.0	Macintosh	C
Database Managers			
4th Dimension	Int. 1.03	Macintosh	B
AskSam	3.0	MS-DOS	B
Clipper	S87	MS-DOS	B
DATAEASE	2.5	MS-DOS	B
dBASE II	—	CP/M	B
dBASE III Plus	1.1	MS-DOS	A
FoxBASE	2.14u	MS-DOS	C
Notebook II	2.03	MS-DOS	C
REFLEX	—	MS-DOS	B
ViewFinder III	—	MS-DOS	B
ZyINDEX	—	MS-DOS	B
Desktop Publishing			
PageMaker	3.0	Macintosh	A
PageMaker	3.0	MS-DOS	A

Software List continued

Package/Compiler	Version	Environment	Support
Ventura	1.1	MS-DOS	B
XPress	1.0	Macintosh	C
Electronic Mail			
Microsoft Mail	1.36	Macintosh	B
QuickMail	1.0	Macintosh	B
Graphics			
Charting			
35mm Express	4.02	MS-DOS	B
Cricket Graph	1.2	Macintosh	C
Freelance Plus	2.01	MS-DOS	B
Lotus 1-2-3	2.01a	MS-DOS	B
Microsoft Excel	1.5	Macintosh	B
Microsoft Excel	2.0	MS-DOS	B
SigmaPlot	—	MS-DOS	C
Draw and CAD			
Aldus Freehand	1.0	Macintosh	B
Cricket Draw	1.1	Macintosh	C
Generic CADD	3.0	MS-DOS	C
MiniCad	4.05	Macintosh	C
Illustrator	1.0	Macintosh	B
Illustrator88	1.6	Macintosh	B
MacDraft	1.2a	Macintosh	C
MacDraw	1.95	Macintosh	A
MacDraw II	1.0v1	Macintosh	B
Windows Draw	1.02	MS-DOS	C
Image and Scanning			
ImageStudio	1.05	Macintosh	B
Publish Pac	2.0	Macintosh	B
Publish Pac	2.0	MS-DOS	B
Text Pac	2.0	MS-DOS	B
Paint			
DR HALO	1.23	MS-DOS	C
MacPaint	2.0	Macintosh	A
Microsoft Paintbrush	2.0	MS-DOS	C
PC Paintbrush	2.5	MS-DOS	C
SuperPaint	1.1	Macintosh	B
Windows Paint	2.03	MS-DOS	C
Plotting Subroutines			
WATCOM GKS	1.3	MS-DOS	B
Numerical			
Derive	1.07	MS-DOS	C
Eispack	n/a	MS-DOS	C
Eureka	n/a	MS-DOS	C
GAUSS	2.0	MS-DOS	B
IMSL	10.0	MS-DOS	A
Linpack	n/a	MS-DOS	C
MathCAD	2.0	MS-DOS	C
muMATH-83	4.12	MS-DOS	C
Operating Systems			
IBM PC, PS/2, and compatibles			
IBM OS/2	1.0	n/a	B
IBM PC-DOS	3.3	n/a	B
Microsoft MS-DOS (incl IBM PC-DOS)	3.2	n/a	A
Microsoft Windows	2.03	n/a	A
Microsoft Windows 386	2.03	n/a	C

Software List continued

Package/Compiler	Version	Environment	Support
Macintosh II, Macintosh SE, and Macintosh Plus			
Finder	6.1	n/a	A
MultiFinder	6.0.1	n/a	A
System	6.0.2	n/a	A
Apple II			
Apple II DOS	3.3	n/a	C
CP/M	2.20	n/a	C
ProDos	1.0	n/a	C
Sound			
SoundWave	1.0	Macintosh	B
MacRecorder	1.0	Macintosh	B
Spreadsheet			
APPLEWORKS	—	MS-DOS	C
HAL	1.0	MS-DOS	B
Lotus 1-2-3	2.01a	MS-DOS	B
Microsoft Excel	1.5	Macintosh	B
Microsoft Excel	2.0	MS-DOS	B
Multiplan	1.5	Macintosh	C
Statistical			
MACSPIN	1.5	Macintosh	C
Minitab	82.1.1	MS-DOS	C
PowerStat	1.04	MS-DOS	C
SAS/PC	6.03	MS-DOS	A
SPSS/PC+	2.0	MS-DOS	A
STATPRO	2.0c	MS-DOS	C
STATWORKS	1.2	Macintosh	B
SYSTAT	3.2	Macintosh	B
SYSTAT	3.2	MS-DOS	B
Word Processing			
FinalWord II	2.0	MS-DOS	B
MacWrite	5.01	Macintosh	B
Manuscript	1.0	MS-DOS	C
Microsoft Word	3.01	Macintosh	A
Microsoft Word	4.0	MS-DOS	A
Nota Bene	3.0	MS-DOS	B
Nota Bene SLS	3.0	MS-DOS	B
PC-TeX	2.1	MS-DOS	B
Sprint	1.0	MS-DOS	B
T^3	—	MS-DOS	C
Volkswriter Scientific	—	MS-DOS	C
WordPerfect	4.2 & 5.0	MS-DOS	A
WordPerfect	1.0	Macintosh	C
WordStar	3.3	MS-DOS	B
Utilities			
Apple Turnover	—	MS-DOS	A
FASTBACK	—	MS-DOS	B
Norton Utilities	4.0	MS-DOS	A
Copy II Disk	7.1	Macintosh	B
MacZap	5.1	Macintosh	B
Sidekick	—	MS-DOS	B
SuperKey	—	MS-DOS	C
TURBO Lightning	—	MS-DOS	C
XenoDisk	1.41	MS-DOS	A

UTCS Software List

SOFTWARE LIST for MAINFRAME COMPUTERS VM/CMS, UNIX

Each programming language or package available at UTCS has a support level. In general, Class A Products receive full support, Class B limited support (as time and resources allow), Class C no active support.

For complete details of UTCS product support policy, see the UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction.

Package/Compiler	System	Support	Version
Communications			
Kermit	VM/CMS	A	---
Kermit	UNIX	B	4C(058)
FTS	VM/CMS	A	---
MAIL/MAILBOOK	VM/CMS	A	86.359
MICROLASER	VM/CMS	A	---
macget/macput	UNIX	C	---
netcopy, netexec, to (NetNorth Tools)	UNIX	B	---
xmodem	UNIX	C	---
ftp,rsh,rlogin,telnet,rcp (Access via TCP/IP to most of the networked machines on all three campuses)	UNIX	B	---
rn/Pnews	UNIX	B	---
mail,mh,Mail	UNIX	-	---
Graphics			
PLOTBASIC (FORTRAN)	VM/CMS	C	---
SAS/GRAPH	VM/CMS	A	5.16
Languages			
ASSEMBLER(F)	VM/CMS	C	---
Concurrent Euclid	VM/CMS	C	1.9
FORTUTILS	VM/CMS	A	2.2
PL/I OPT Compiler	VM/CMS	B	1.5.1
REXX	VM/CMS	A	---
SNOBOL 4	VM/CMS	C	3.5
Turing	VM/CMS	C	---
VS FORTRAN	VM/CMS	A	1.4.1
VS Pascal	VM/CMS	C	2.2
Waterloo C	VM/CMS	C	1.3
WATFIV	VM/CMS	C	V2L0
WATFOR-77	VM/CMS	A	1.3
cc	UNIX	A	---
f77	UNIX	C	---
ratfor	UNIX	C	BSD std.
ttc	UNIX	C	---
pc	UNIX	C	BSD std.
yacc	UNIX	C	---
awk	UNIX	C	---
adb,dbx	UNIX	C	BSD std.
Numerical			
IMSL	VM/CMS	A	9.2,10.0
LINPACK	VM/CMS	C	---
NAg	VM/CMS	A	Mark 11
Statistical			
BMDP	VM/CMS	A	Level 85, Level 87
Minitab	VM/CMS	B	5.1
NAg	VM/CMS	A	Mark 11
NTSYS	VM/CMS	C	---
SAS	VM/CMS	A	5.18
SPSS^x	VM/CMS	A	2.2

Software List continued

Package/Compiler	System	Support	Version
Text Processing			
SCRIBE	VM/CMS	C	4(1400)-1
Waterloo SCRIPT	VM/CMS	B	86.1
XEDIT	VM/CMS	A	---
8700 Pseudotypesetting	VM/CMS	C	n/a
MICROLASER	VM/CMS	A	---
ed	UNIX	A	---
vi	UNIX	C	---
cmacs	UNIX	C	---
spell	UNIX	C	---
diction/explain	UNIX	C	---
eqn	UNIX	B	---
tbl	UNIX	B	---
pic	UNIX	C	---
troff	UNIX	B	---
nroff	UNIX	B	---
TeX	UNIX	C	---
Utilities			
FORTUTILS	VM/CMS	A	2.2
TPRINT	VM/CMS	C	---
crypt	UNIX	A	BSD std.
compress	UNIX	C	BSD std.
csh	UNIX	B	BSD std.
diff	UNIX	A	BSD std.
grep	UNIX	A	BSD std.
ipr	UNIX	B	---
learn	UNIX	C	BSD std.
patch	UNIX	C	---
sed	UNIX	A	BSD std.
sort	UNIX	A	BSD std.
sh	UNIX	A	BSD std.
tar	UNIX	A	BSD std.
uniq	UNIX	A	BSD std.

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